Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

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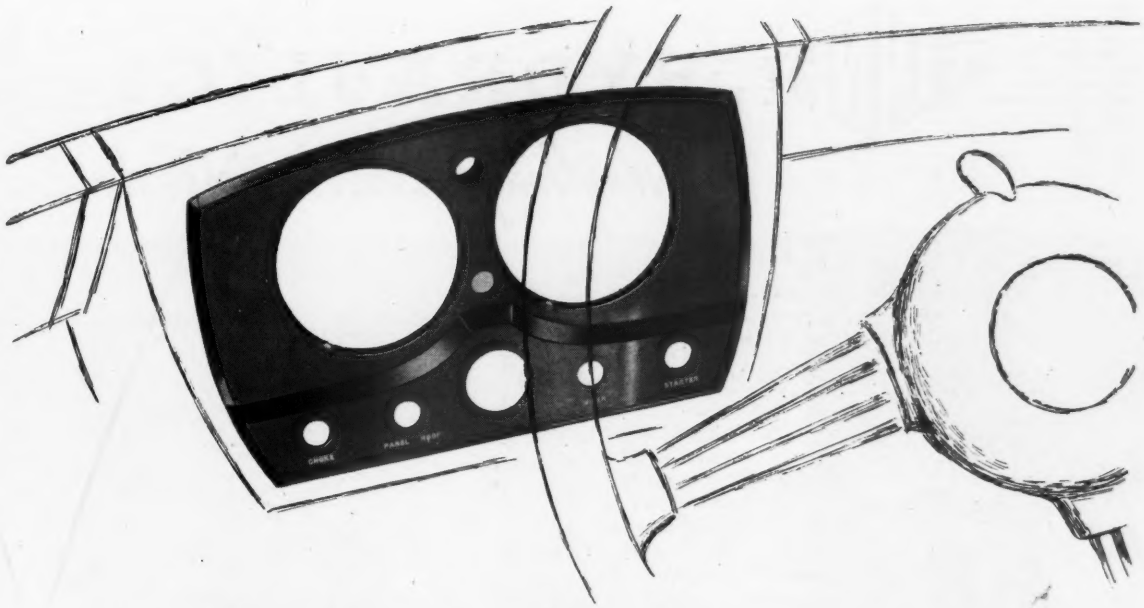
May we give you a mixing demonstration with your own materials?

[redacted]



Cellomold *takes a front seat*

TRIUMPH "MAYFLOWER" INSTRUMENT PANEL MOULDED IN CELLOMOLD

Cellomold moulding materials are right in the front—as this new facia fitting for the Triumph "Mayflower" car goes into full scale production. British Moulded Plastics Ltd. had to provide lightness, durability and strength plus an attractive, high-gloss finish in this moulding. And the material they needed, to achieve these results, had also to possess excellent flow characteristics *and* give the maximum ease of working. They chose from the Cellomold range, as a result of long experience, and assured the success of yet another of their productions. Cellomold cellulose acetate moulding materials are designed to meet every moulding specification and are available in such a variety of colours, effects and degrees of flexibility that their scope is limitless. To obtain complete technical details about them, you have merely to 'phone or write to our Sales and Technical Service, at 21, St. James's Square, London, S.W.1. Telephone: Whitehall 8021 (7 lines).

BRP

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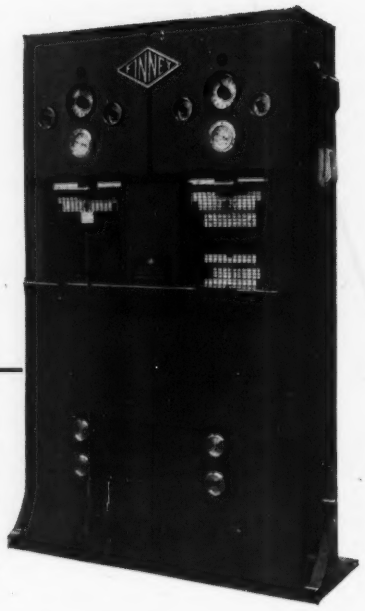

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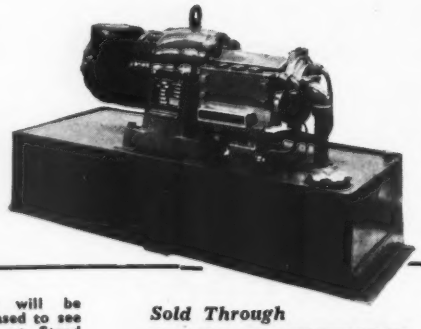

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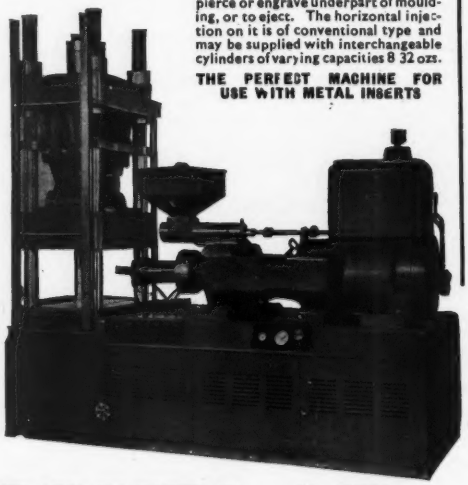

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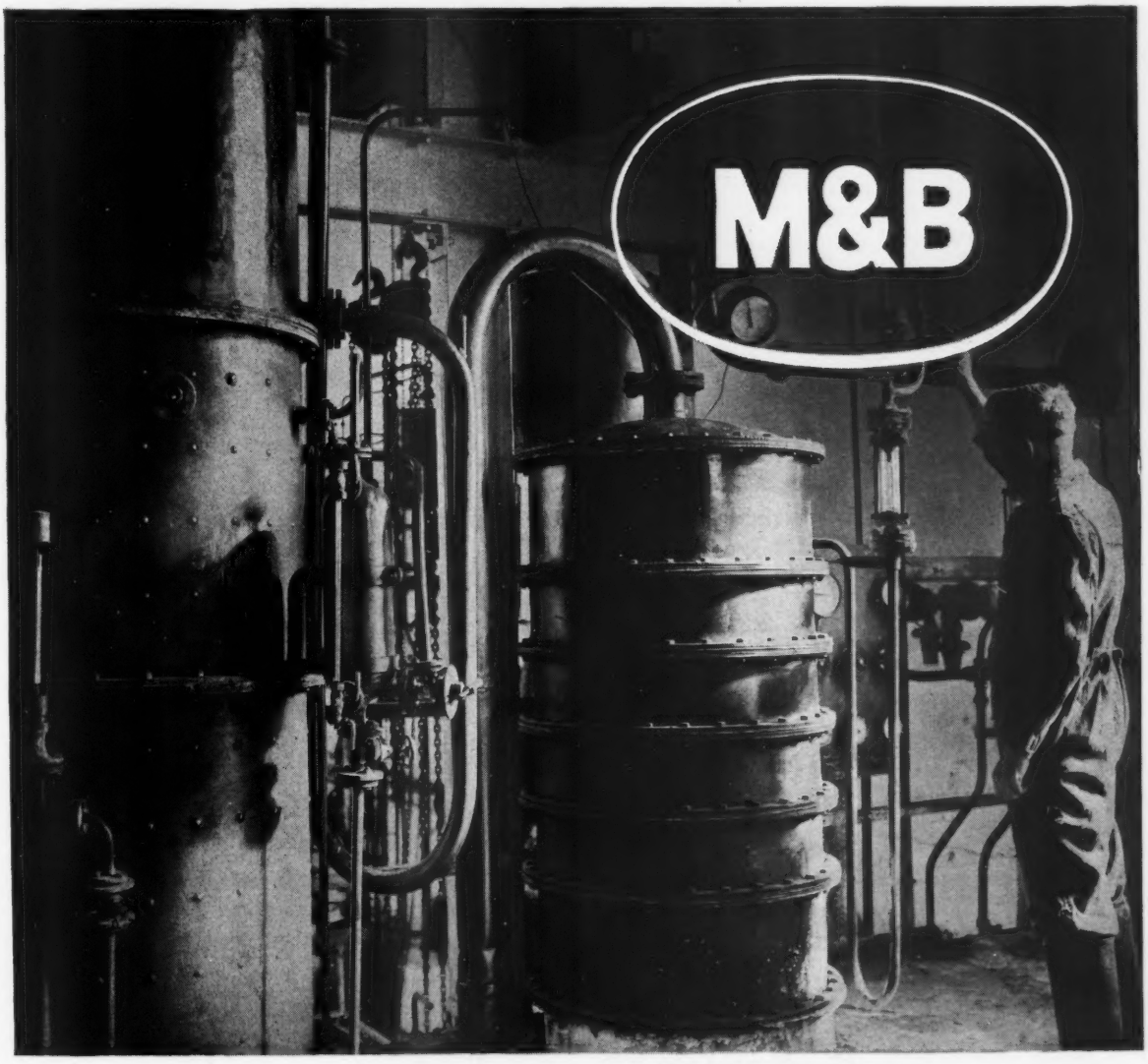

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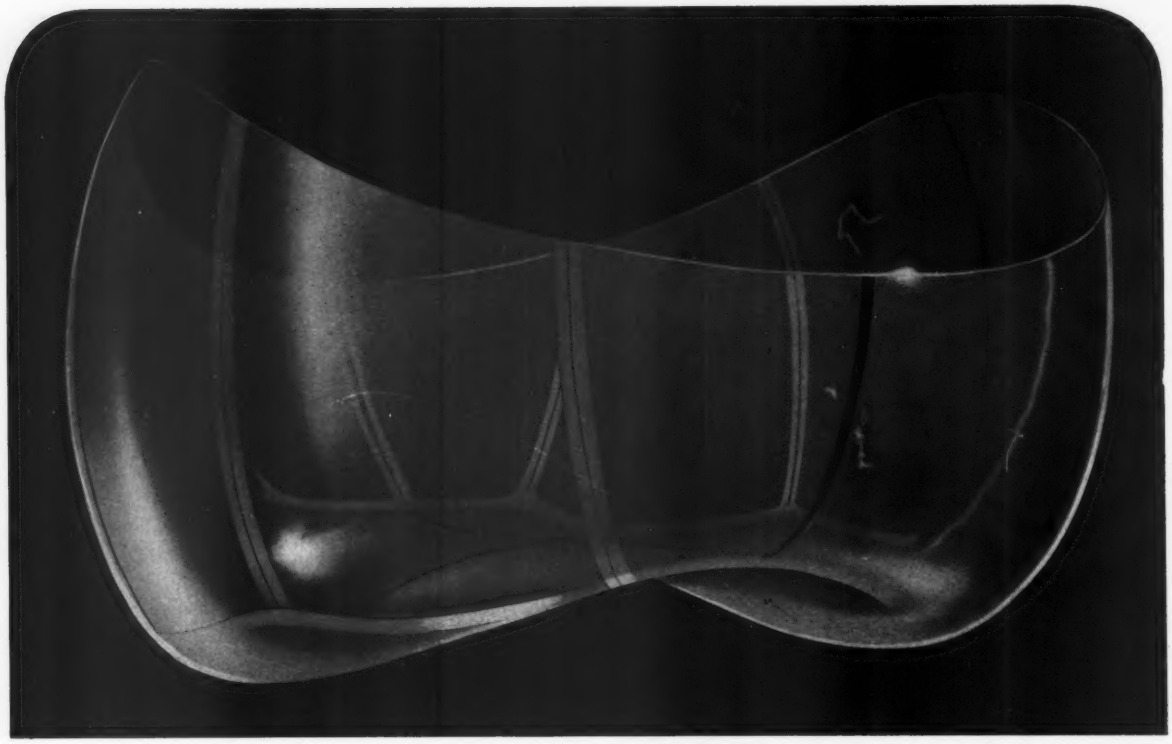

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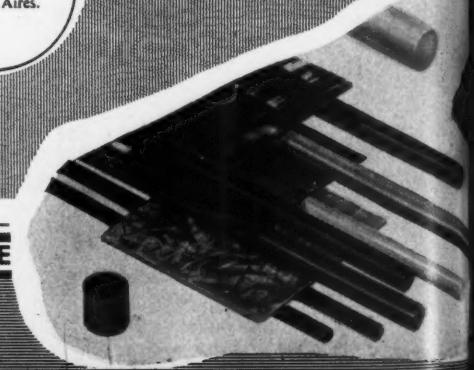

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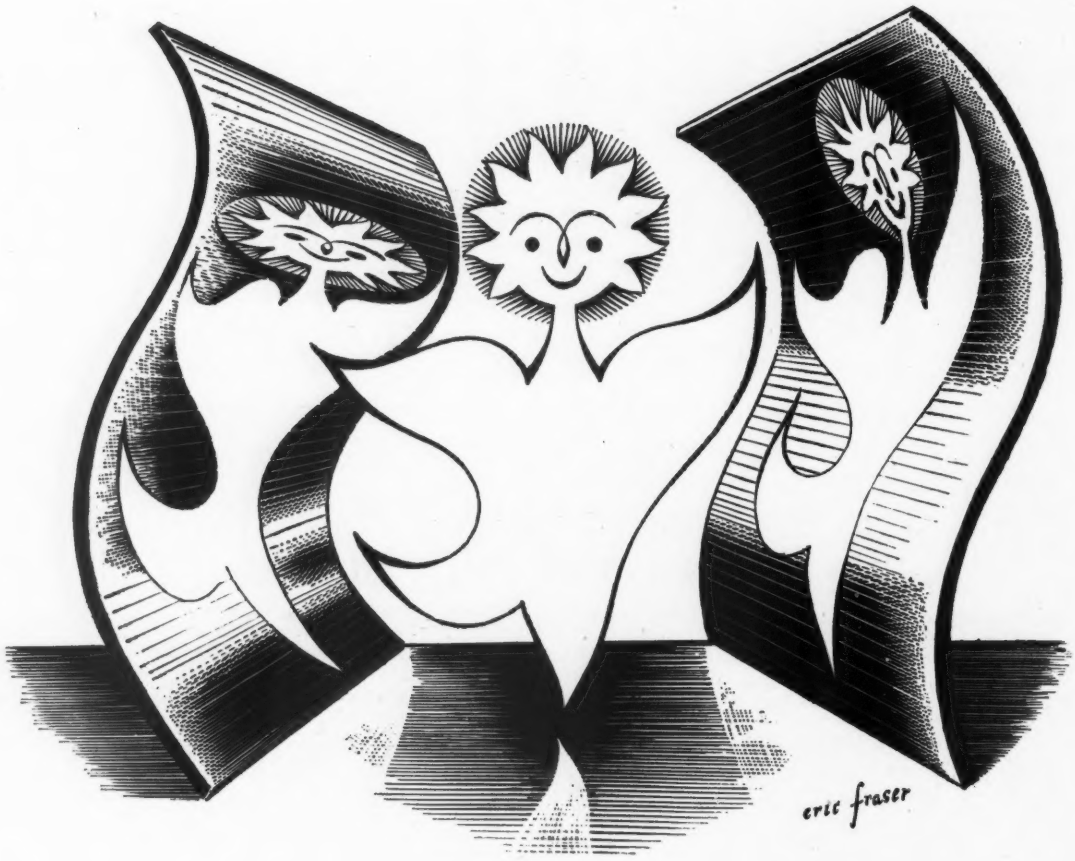

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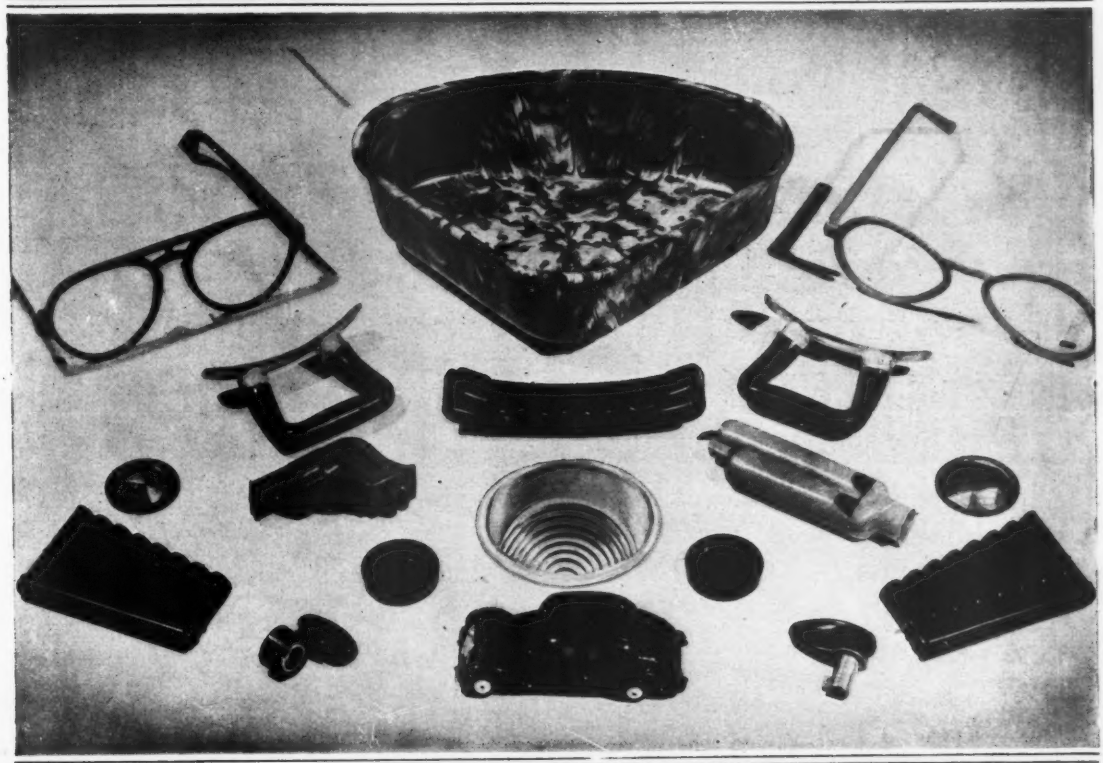

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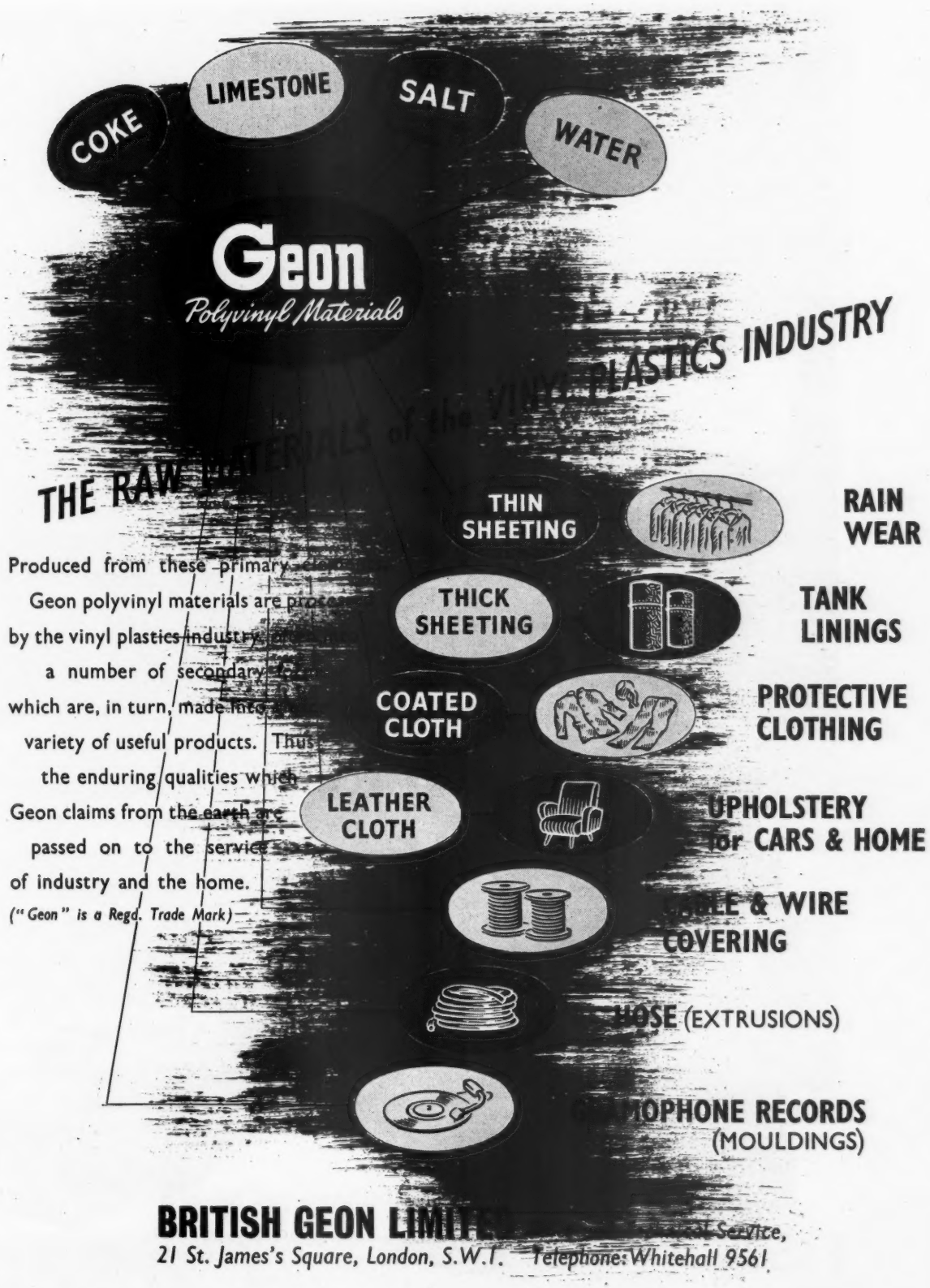

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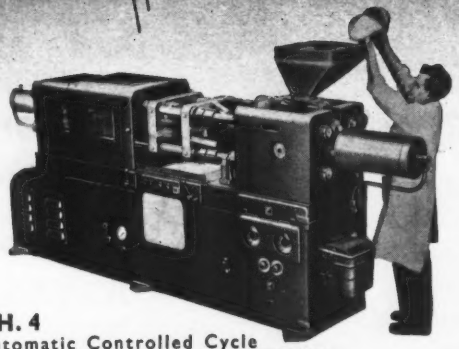

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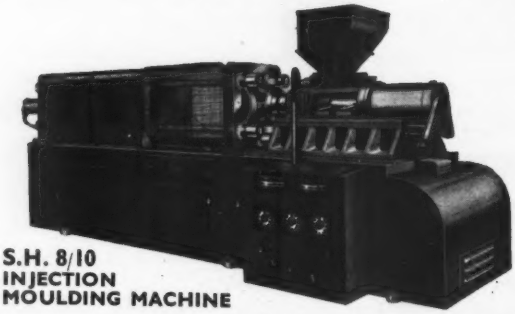

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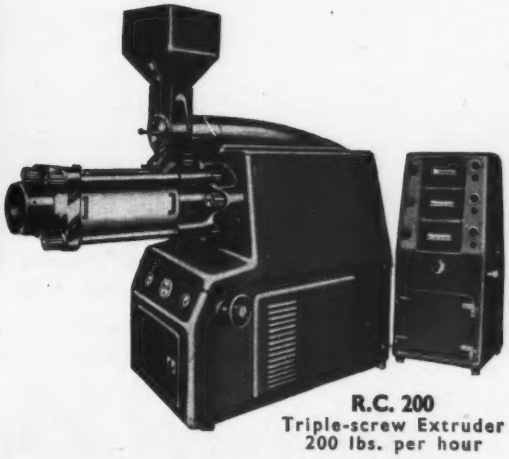

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You humans are all Squirts!

On principle I normally object to being a vehicle for advertising, but what is a fellow to do when he is asked to testify to the processes of his creation by his creator ?

I said to N.R., "You, sir, have an elephantine ego."

"Oh! Don't be obstreperous, Jumbo," he said mildy, "If you don't testify, I won't make a fresh batch of 3,500,000 brothers for you!"

So I have no option but to testify as follows: The Cellulose Acetate from which I am made is a "Tudor Rose" product made by **R. C. Mills Ltd.**—*and very fine Cellulose Acetate it is.*

The Tools which fashioned the very fine Cellulose Acetate are *Manwood* tools—*and very fine injection moulding tools they are.* The elephant which I am—complete with squirter and world-wide appeal to children—was made by **Rosedale Associated Manufacturers** *and makers of very fine and ingenious toys they are . . . Tudor Rose Toys!*

The handy, sales-compelling cartons in which I and other "Tudor Rose" toys are packed were made by *Twigg (Boxes) Ltd.—and very fine boxes they are.*

N.R. is the boss of all these activities and he very much wants to see you when you come over—either at his offices anytime—or at **British Plastics Exhibition, Stand No. A.10, or at B.I.F., Stand No. N.26.**

Do please come because I would like to tell you how an elephant feels doing this sort of thing.

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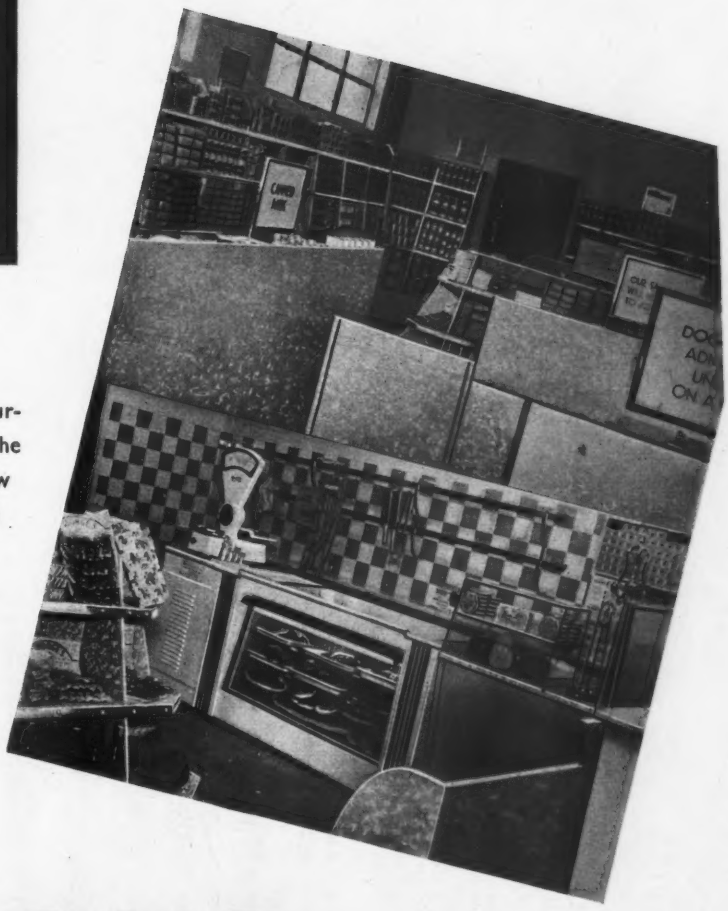

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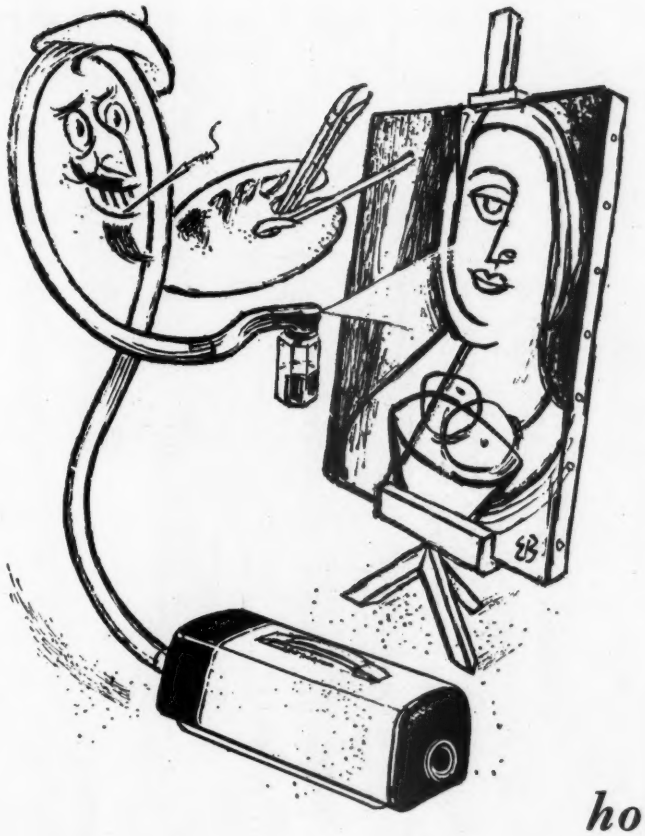

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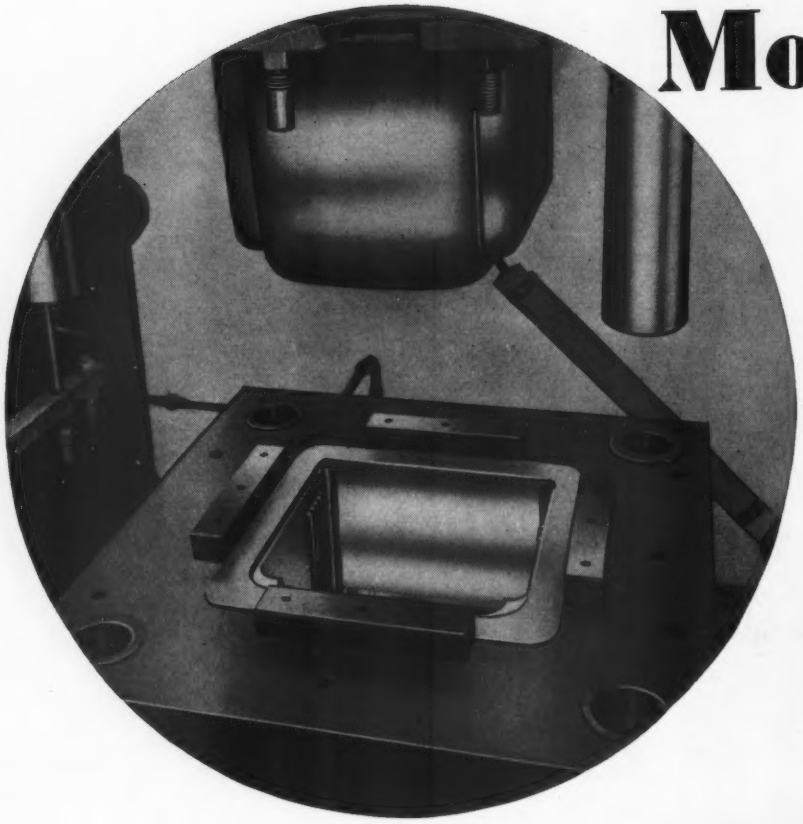

The photographs show the mould and a Bush Television cabinet manufactured by British Moulded Plastics, Ltd. The Dies are made from PLMB/1 Steel manufactured by English Steel Corporation Ltd.

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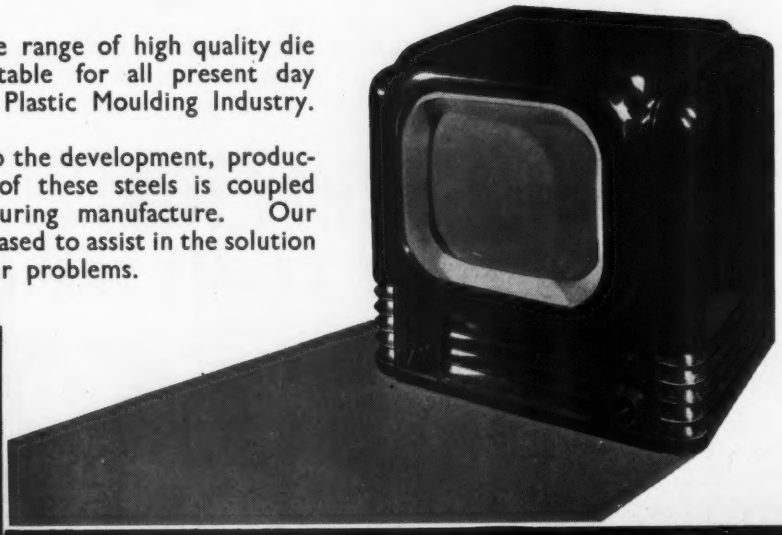

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P.436

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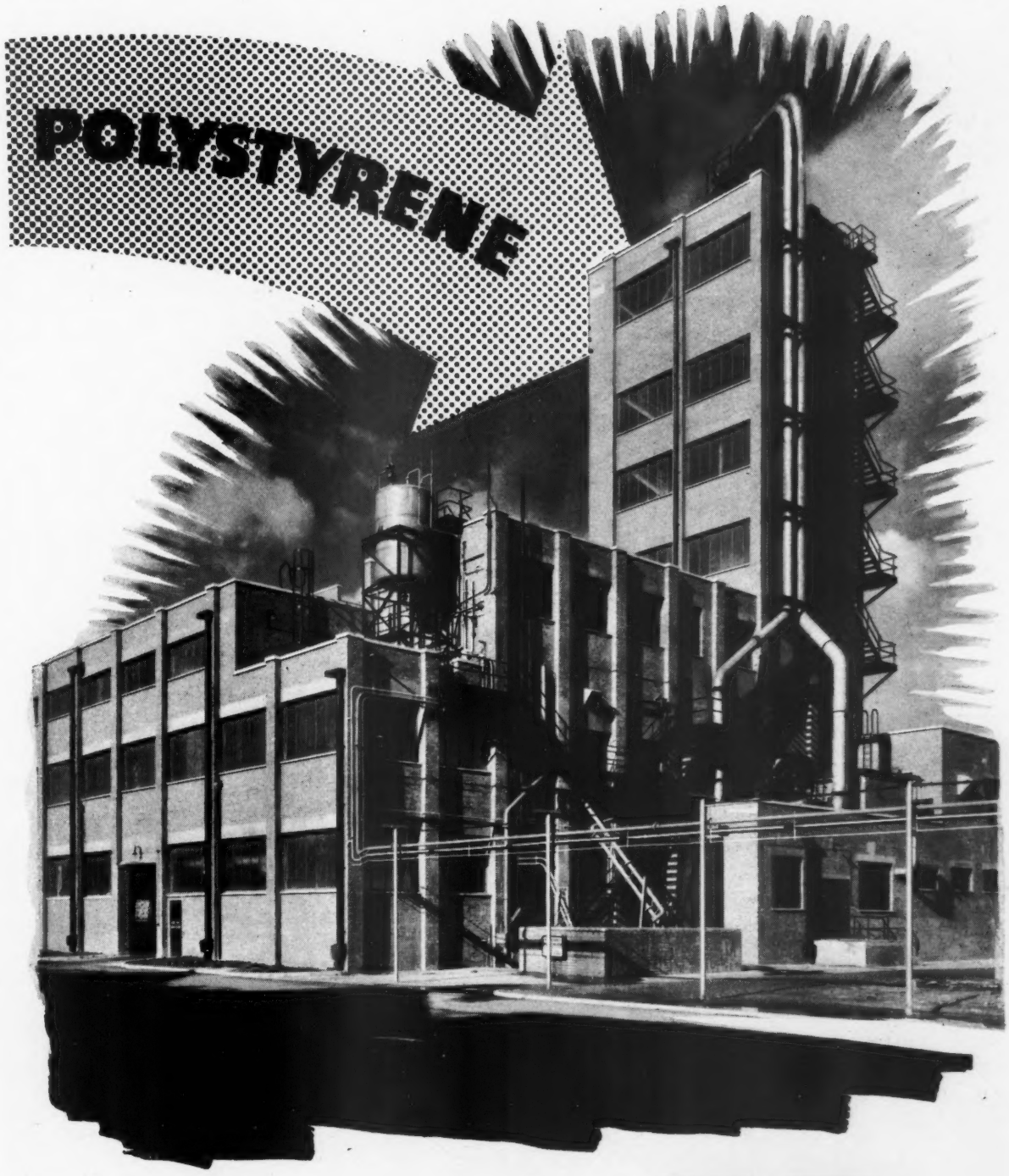

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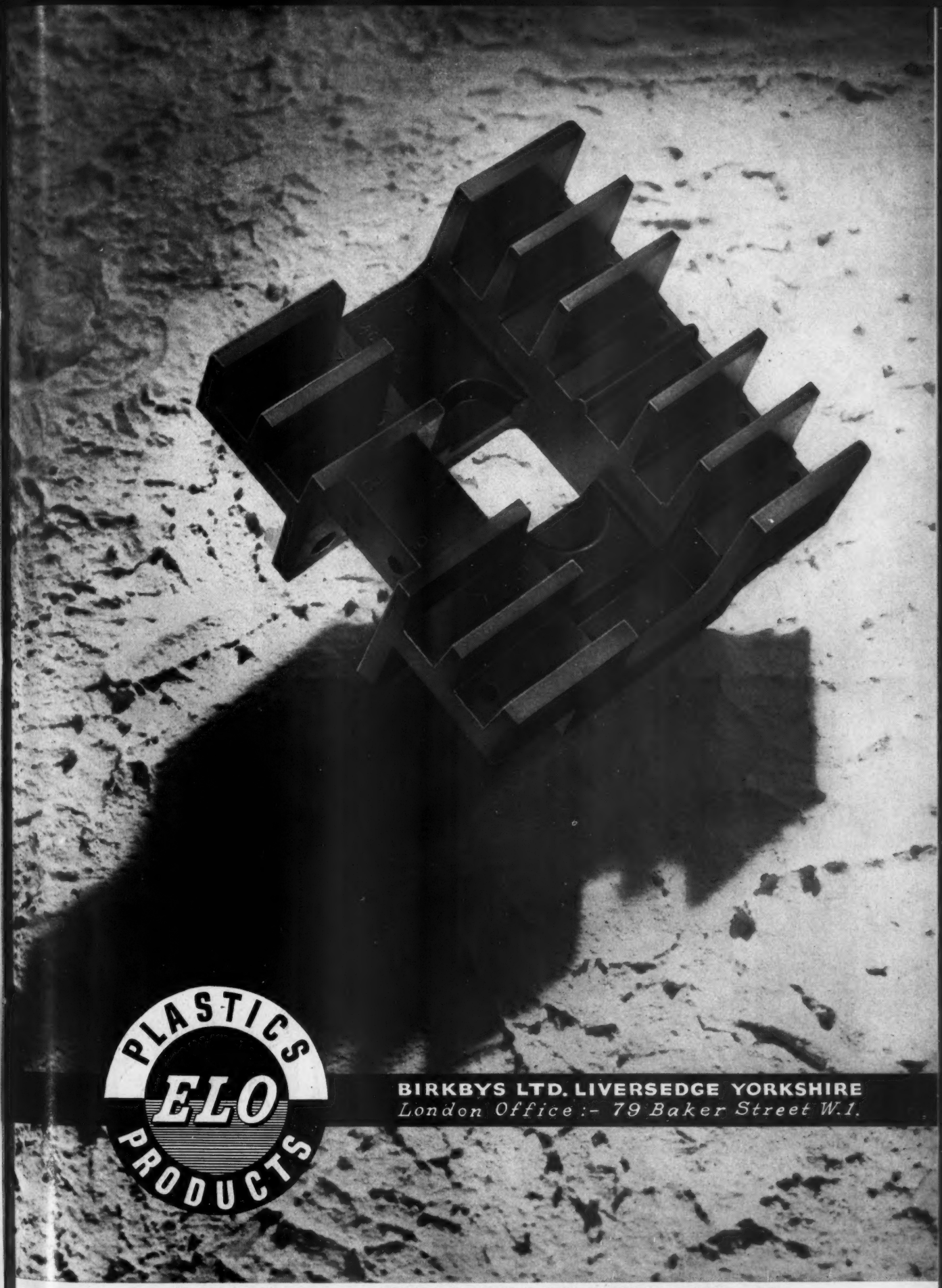

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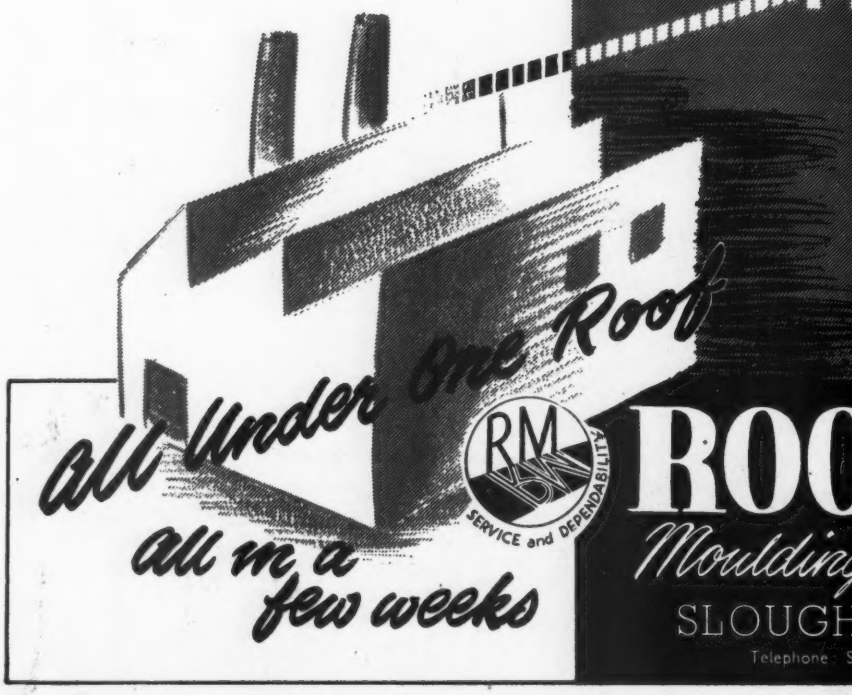

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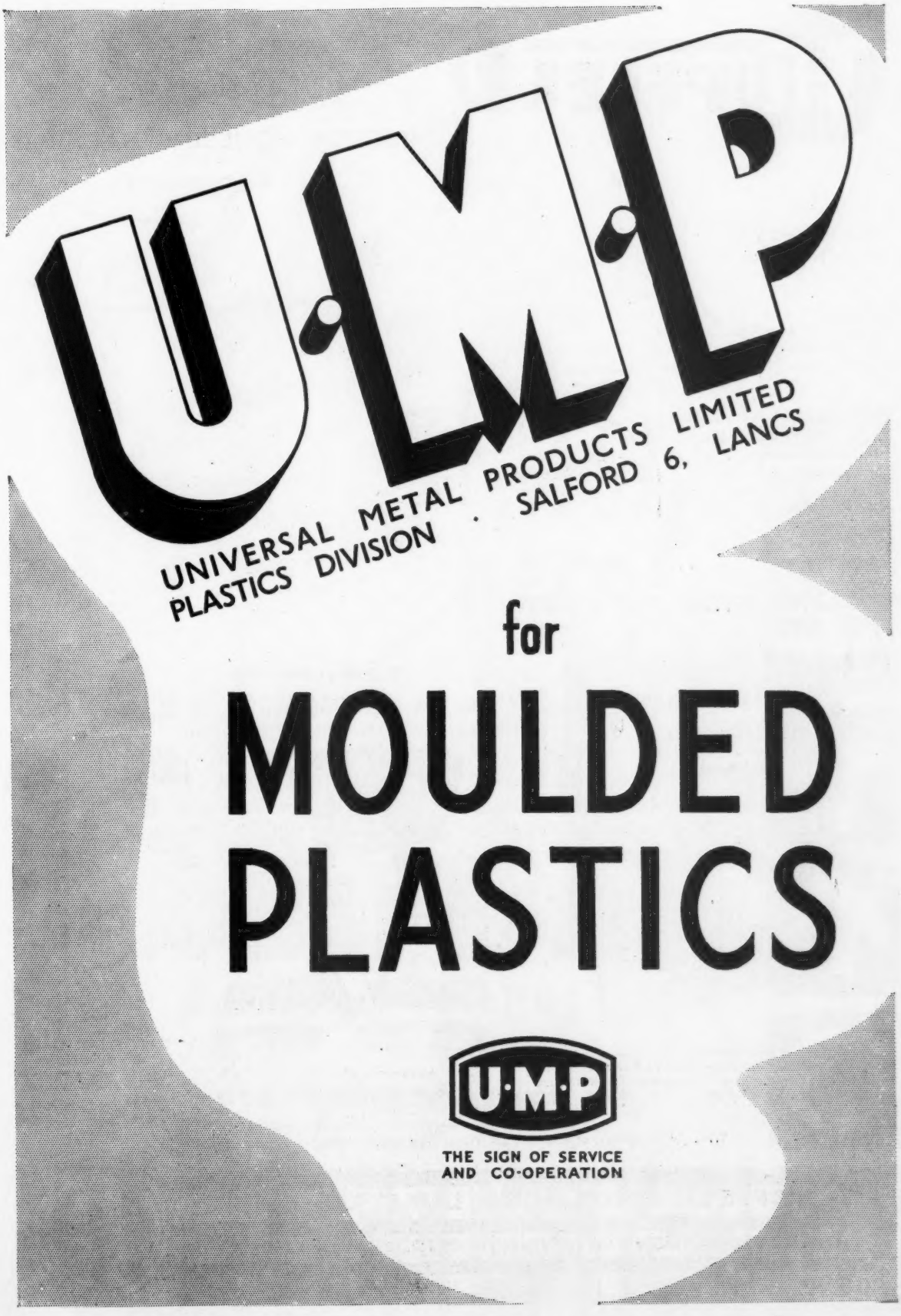
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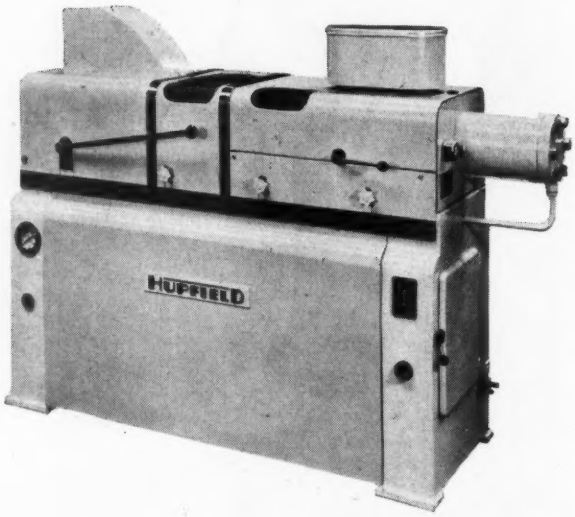
	1 oz.	2 oz.
Mould area approximately..	12 sq. in.	22 sq. in.
Plasticizing capacity per hour	9 lb.	18 lb.
Injection pressure	5½ tons	11 tons
Mould locking pressure ..	22 tons	44 tons
Shots per hour, subject to mould design	350	250



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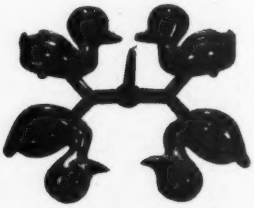
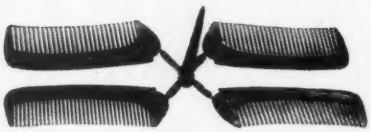
Mouldings from our 1 ounce machine

polystyrene 3¾" dia.
25 seconds. 1 ounce.



cellulose acetate 5½" × 5"
30 seconds. 31 gramme.



polystyrene 8" × 3¼"
20 seconds. 24 gramme.

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STAND D.724

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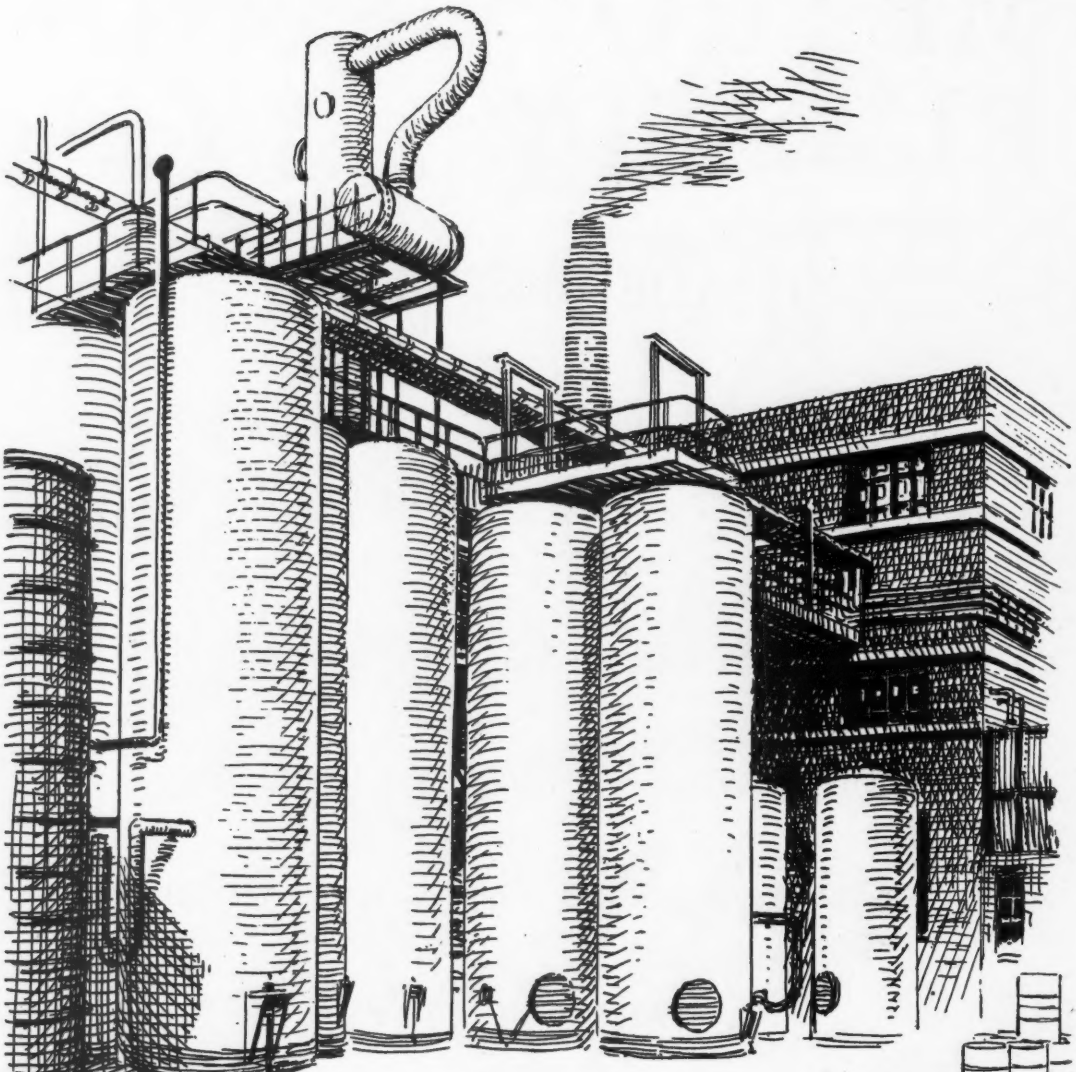

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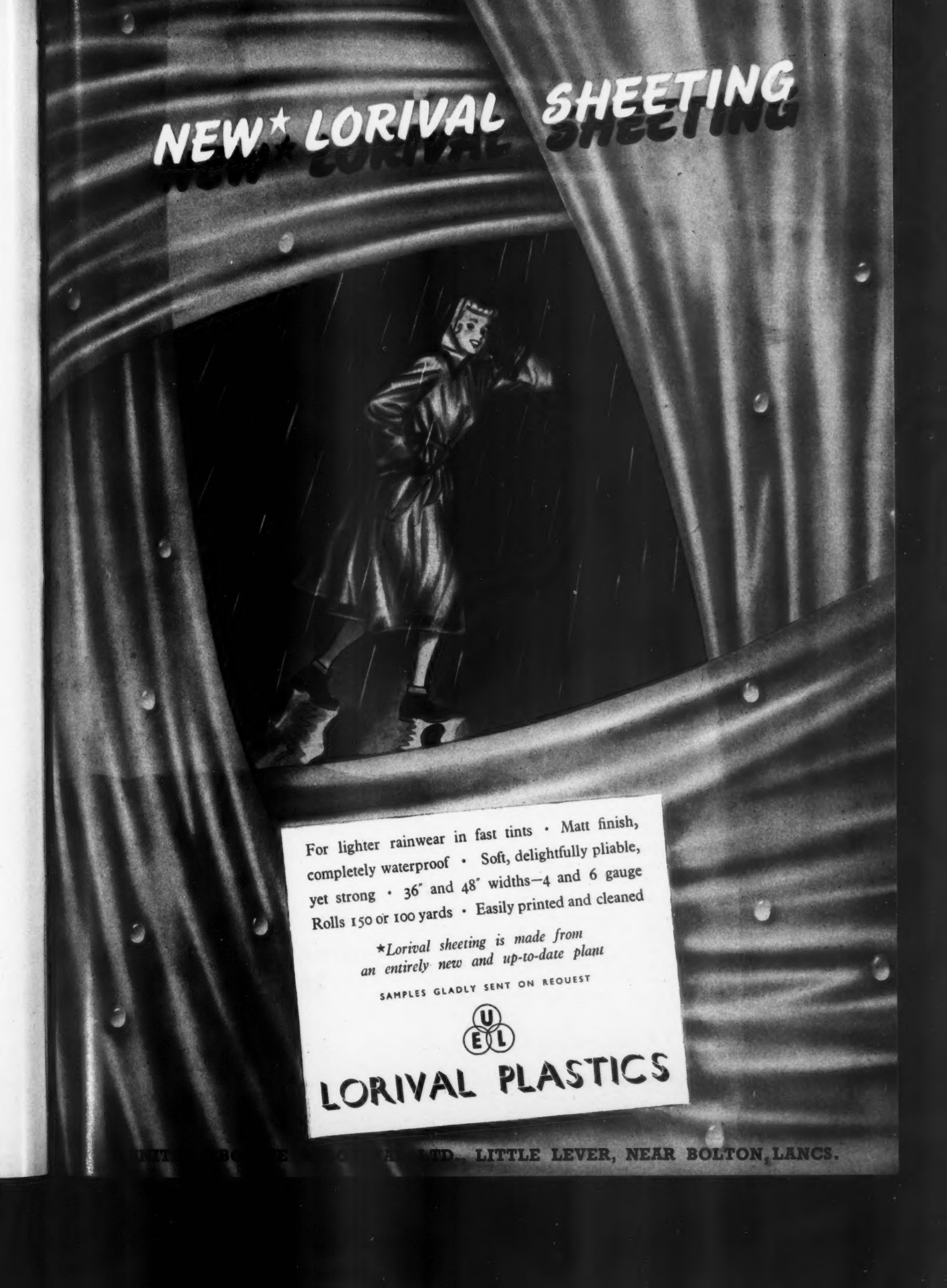
Affiliated Companies and Representations in Australia, South Africa and all Industrial Countries.

P18



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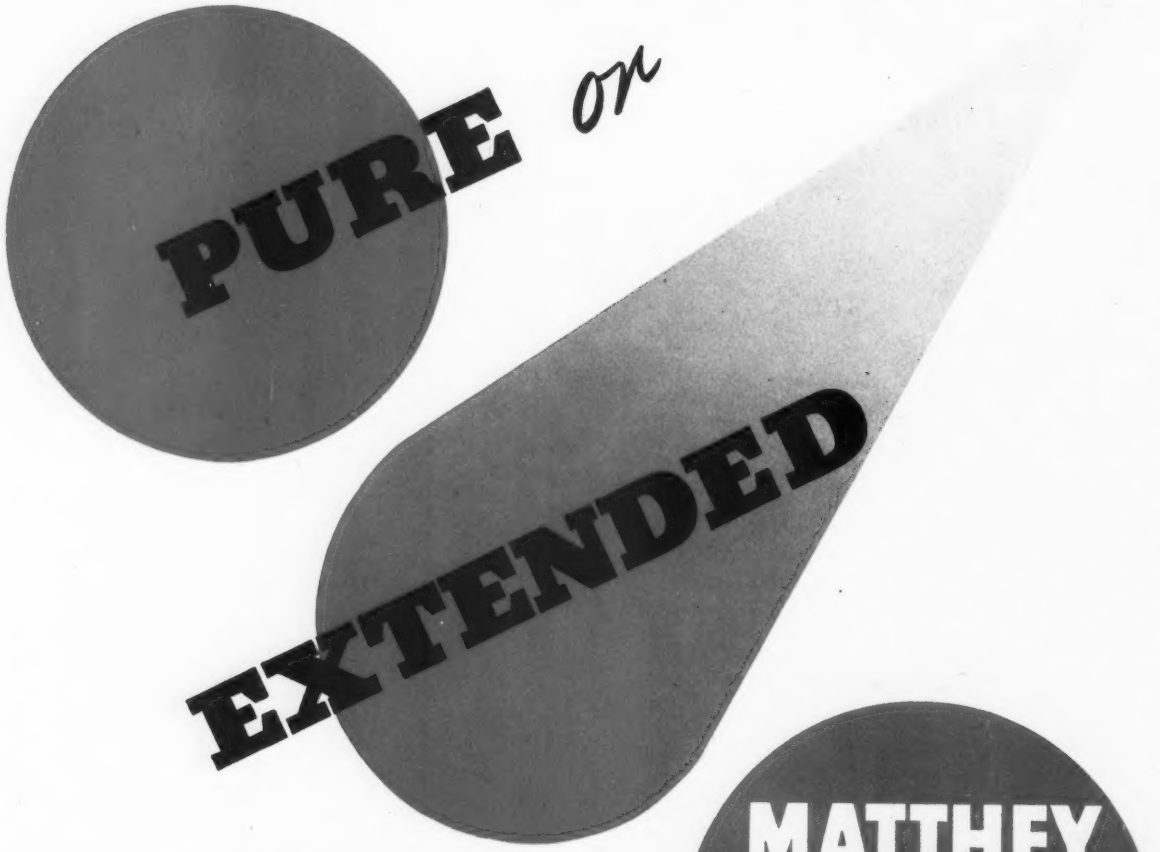


So varied in nature are the present-day forms and applications of plastic materials that the pigments they embody must show great powers of resistance to attack from both external and internal sources.

Indeed, progress in the past has waited upon the provision of pigments having such all-round stability—in the development of Polyvinyl Chloride, for example, a plastic whose pigments must withstand exceptionally severe chemical and thermal effects during processing.

Matthey cadmium pigments, while eminently suitable for use in plastics of any type, possess in high degree the qualities needed to ensure successful pigmentation in this, undoubtedly the most exacting process to which a plastic colouring agent may be submitted.

MATTHEY CADMIUM PIGMENTS

One of the Specialised Products of

Johnson Matthey

Publications 313 *and* 1676 *deal fully with the subject, and we shall be glad to send you copies upon request. Please do not hesitate to write to us regarding any pigmentation problem you may encounter.*

JOHNSON, MATTHEY & CO., LIMITED · HATTON GARDEN · LONDON, E.C.1

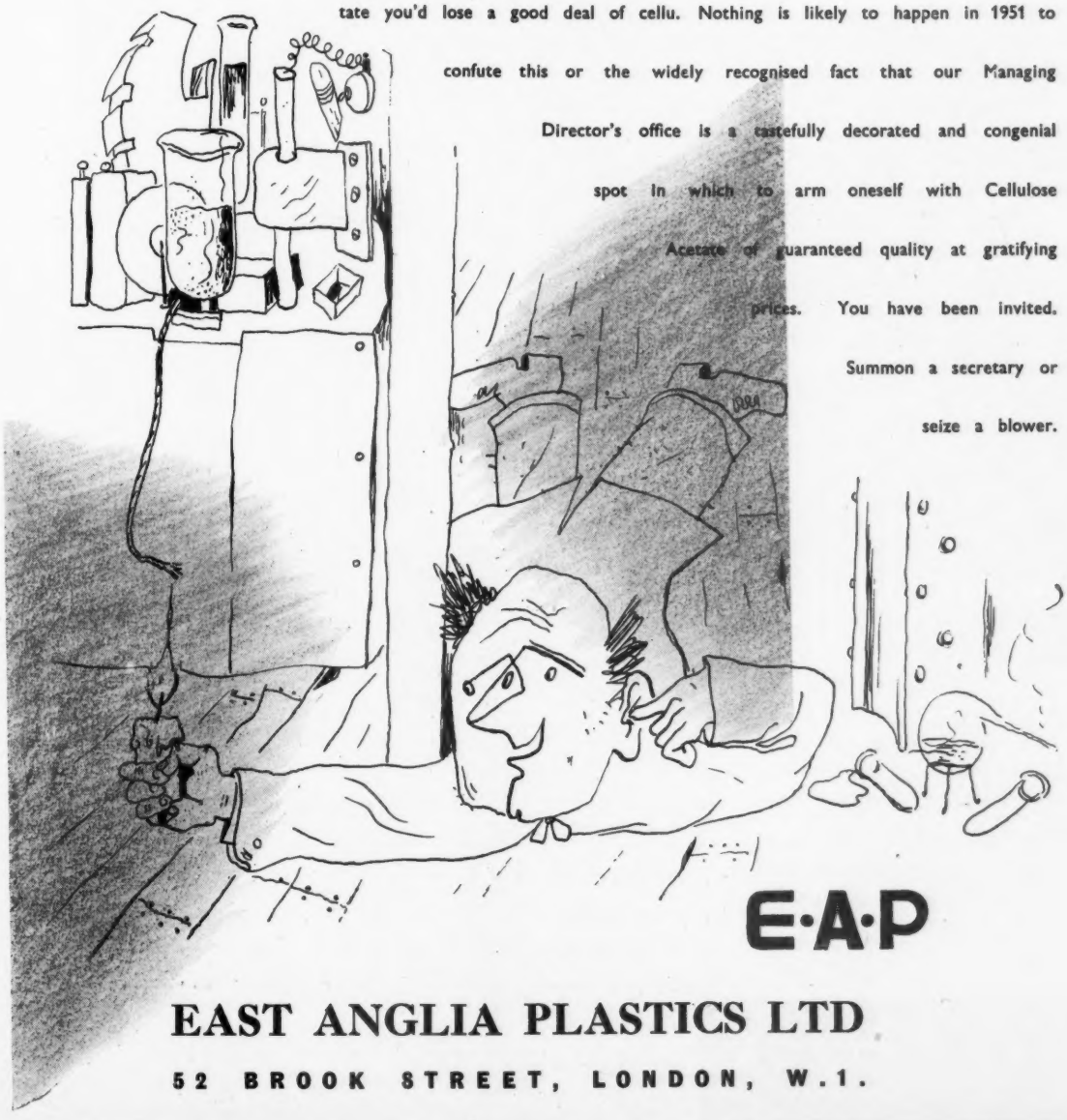
GD 154

WE'VE PUT A FRESH IDIOT ON OUR ADVERTISING!

All that airy-fairy stuff about Plasticia produced three abusive letters from Albania, a request for the hand of the Duchess from Freetown, and a letter asking for samples from our Advertising Agents.

Very satisfactory in its way, but you watch now! We're dropping all the nonsense and concentrating on solid tech ical stuff. When you've read an E.A.P. advertisement, from now on, you will be a wiser man, better equipped to make your mark in Life or, for that matter, in The Manchester Guardian. *Read on!*

Among injection moulders of the 1950's it was a long-held belief that if you separated the ace by the Speller-Finklemann process from the tate you'd lose a good deal of cellu. Nothing is likely to happen in 1951 to confute this or the widely recognised fact that our Managing Director's office is a tastefully decorated and congenial spot in which to arm oneself with Cellulose Acetate of guaranteed quality at gratifying prices. You have been invited. Summon a secretary or seize a blower.



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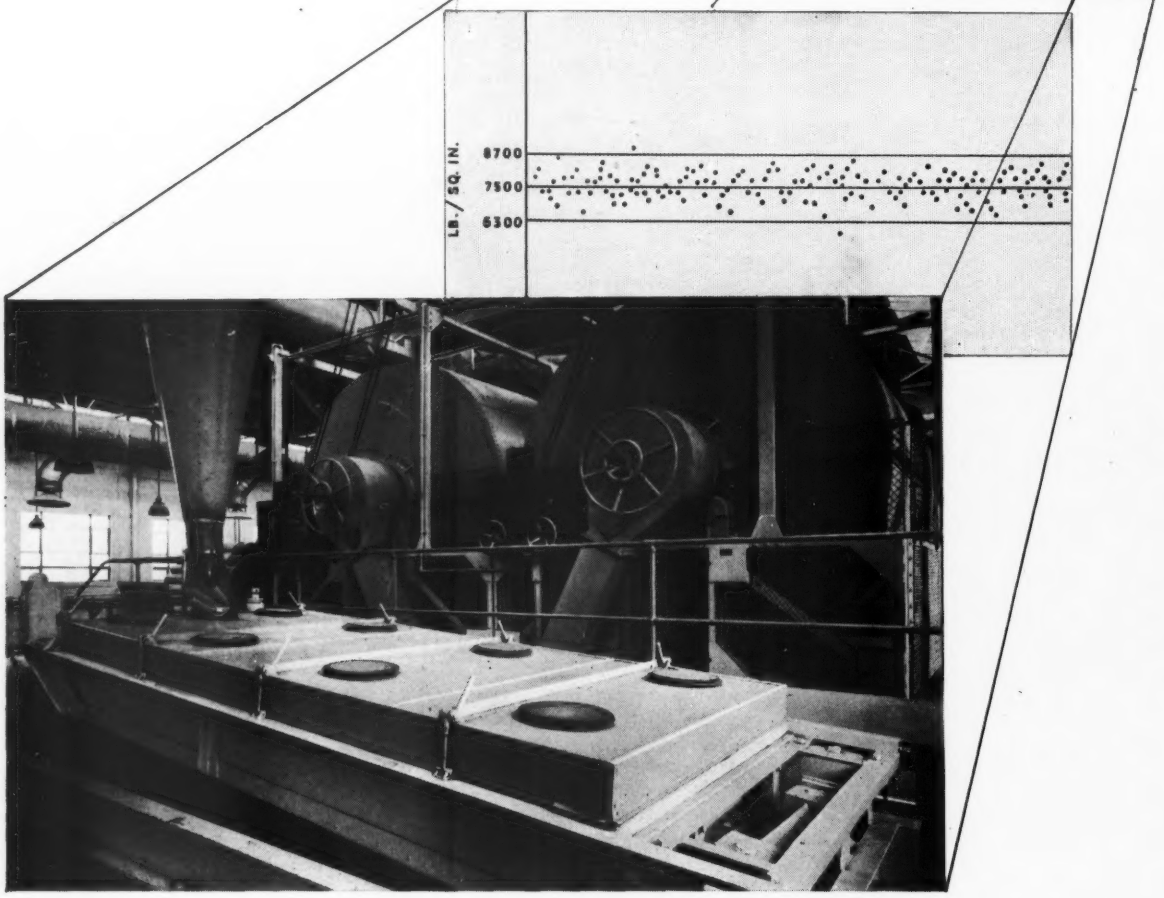
What do you mean by Quality?



BIF STAND NUMBER C.404 BIRMINGHAM

In the currency of words 'quality' has suffered serious devaluation. To have the same meaning to customer and manufacturer, quality must be measured by standards accepted by both. In the factories of Bakelite Limited, statistical quality control is a scientific process, in which the results of many tests are plotted and mathematically analysed to provide a 'case history' of each material. In the plastics industry this type of quality control was pioneered by Bakelite Limited. Statistical control enables quality to be assessed by using a very large number of results of routine tests carried out during manufacture, and the picture it gives is more comprehensive than any other. This provides one of the more obvious reasons for the reliability of BAKELITE moulding materials.

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for dependable mouldings

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Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

PROPRIETORS: TEMPLE PRESS LIMITED

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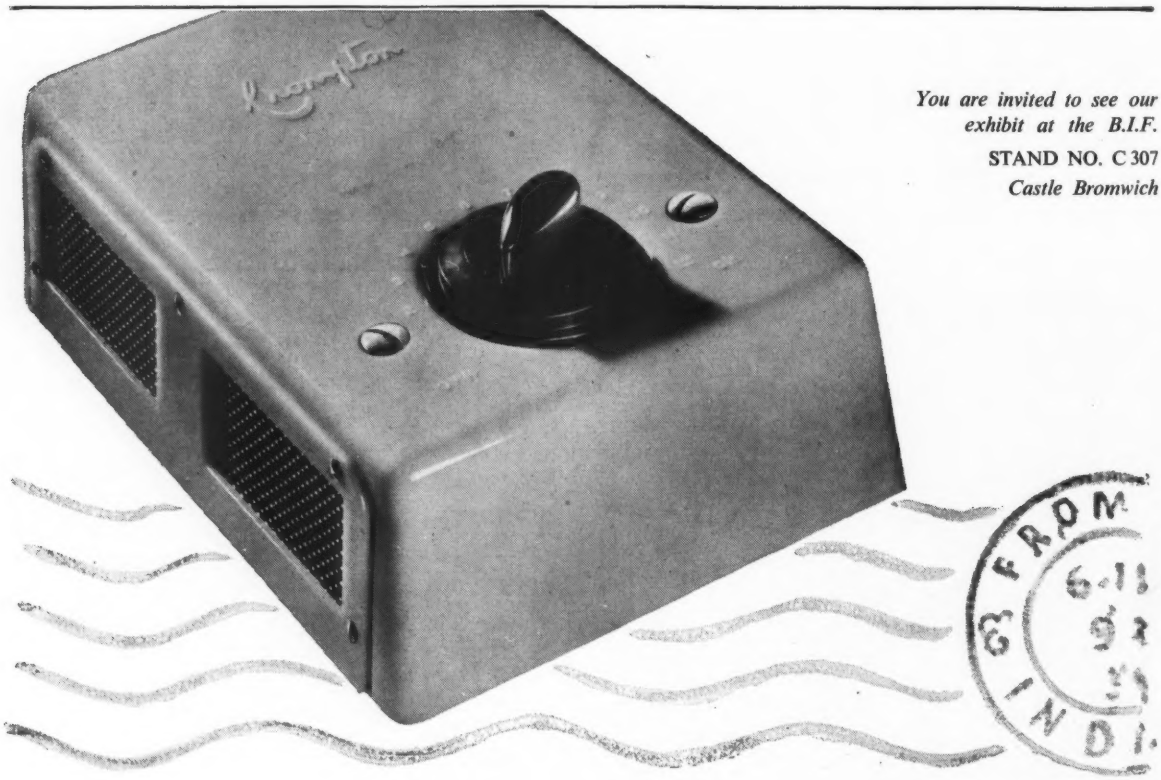
Annual subscription rate 28/-. Shorter periods pro rata.

Moulding the Sobell television console cabinet at the works of British Moulded Plastics, Ltd. (see page 119). The press is open and the moulding has been lifted from the bottom tool; the top tool can be clearly seen.



You are invited to see our exhibit at the B.I.F.
STAND NO. C 307
Castle Bromwich

FAN-MAIL FROM INDIA

The parts of this Crompton-Parkinson fan regulator housing have to be moulded within carefully defined limits and a high finish is required of the external components. Although it represents a straightforward compression moulding job, details such as the ingenious design of the air vent claim attention. This consists of wire gauze held between two moulded plates, the whole being assembled as a single unit. In addition to the housing and control knob, there is an internal contact plate having metal inserts.

These mouldings, simple in themselves, nevertheless underline Streetly RELIABILITY. We have been moulding them for Crompton-Parkinson Ltd. for 13 years, during which our customer has received many thousands of orders from India and the Middle East. During that long period our own high standard of moulding and finishing and meticulous system of inspection have contributed significantly to our customer's own smooth production. Even if we mould a small percentage of rejects (and who doesn't), the customer never sees them. *We* weed them out, *before* delivery.

B·I·P GROUP

STREETLY MOULDINGS

The Streetly Manufacturing Co. Ltd. Streetly, Sutton Coldfield, nr. Birmingham
'Phone: Streetly 78411. 'Grams: 'Bang, Streetly.'

Plastics

VOL. XVI. No. 166 MAY, 1951

" Horns may be expanded (strech'd out) or contracted (drawn close together). At Gresham College there is a lanthorn, very clear, and I believe six or seven inches diameter, that is all of one piece : it is said to be blown out so much ; but whether so, or thrust out with tools I know not . . . Winding horns are contracted by their being forced into brass moulds, and so made close, thick, and much longer ; but there is great art in doing it, for if the mould be too hot, 'twill scorch it, and spoil all ; if too cold the horn will not drive."

John Houghton, F.R.S., "Improvement of Husbandry and Trade," No. 107. London, 1694.

EDITORIALS

British Industries Fair

THIS is to be a year of three exhibitions by the plastics industry—the B.I.F., the Festival of Britain, with its plastics section, and the British Plastics Exhibition follow closely on one another.

At the B.I.F. at Castle Bromwich will be seen in full strength those plastics machinery manufacturers as well as those raw-material manufacturers and moulders who have always preferred to show in Birmingham. So far as machinery is concerned, this is not to be wondered at, for Europe, parts of Asia, Australasia, and the Western Hemisphere have not yet reached saturation point. Indeed, even in Great Britain, purchases of modern machinery continue in spite of the raw material situation. Certainly the rapidity with which our machine makers have produced bigger and/or better machines in the last six years has made this country a force to be reckoned with overseas.

The Plastics Section at Earls Court follows the course set last year—the most noteworthy move being the creation of a combined exhibit, under the ægis of the British Plastics Federation, by some of its members. At this combined exhibit the total number of exhibitors has increased, although some few have dropped out. It seems clear, especially in the case of raw material manufacturers and of those moulding companies who specialize in technical moulding or in what is called "trade" moulding, that the high cost of large, separate and elaborate stands is not in fact re-couped by new business. Such moulders know all their British customers and know that exports of such mouldings is extremely limited in view of increasing technology abroad.

On the other hand there is a hard core of other moulders and fabricators (mostly in the thermoplastics field) who manufacture specialities in which the field is very wide and closer to the general public and who did exceptionally good business at last year's B.I.F. Moreover, export continues at a satisfying rate. This group is convinced that good trade will continue and therefore prefer to maintain individual and reasonably large exhibits. To this group are added several newcomers, some of whose novelties and inventions we have already seen and publicized in this journal. Our pages 127-139 will help visitors as a guide to the stands and to the materials and finished goods displayed thereon.

Federation Lunch

IN his speech at the recent British Plastics Federation dinner the chairman, Mr. P. A. Delafield, described how far the industry had moved since what is now considered a datum line, the year 1938 (this is so because the late war clarified the great potentialities of the industry and because use of plastics surged forward in an ever-increasing manner).

Mr. Delafield was very comforting in giving production figures during 1949 as 100,000 tons and hazarded the guess that figures for 1950 will be well over that figure. What was even more encouraging, even startling, was his information that exports of plastics materials in 1950 were valued at £8,000,000, and of weight, 35,000 tons, an export figure that is over 16 per cent. more than the total plastics production of the country for 1938.

It is clear from European visitors we have recently received at this office that Gt. Britain is now regarded as Europe's main source for plastics materials and that our methods of trading have impressed them greatly. Since this relation is of such fundamental importance and since the present shortage of raw materials of every kind has been understood abroad, we have no fear that future exports will be affected when the situation is improved or at least clarified.

Basic Process Continues

STILL more warming news lies in recent notes from raw-material manufacturers. Mr. Potter's report of the activities of Bakelite, Ltd., at its annual general meeting described the satisfactory sales at home and abroad during 1950 and also the overcoming of some of the shortages which have enforced a scheme of rationing. What is very significant, too, is the introduction of new materials, some of which are showing great promise. These include a resin for use as a reinforcing filler in natural rubber, further developments on glass-fibre laminates, a new impregnated paper which can be used for surfacing plywood, and the production and patenting of a special die which enables extruded p.v.c. sections of particularly high gloss to be produced. It is also hoped that the vinyl resin project at Aycliffe will be in operation at the end of 1952.

The other news refers to the activities of Erinoid, Ltd., Hercules Powder Co., Ltd., and James Nelson, Ltd., of Nelson, Lancs (see page 141). A new, large factory is to be erected for the manufacture of cellulose acetate, which gives adequate confirmation of the assurance for the future of this important raw material both for home usage and for exports.

Polyester Resins

A VISIT to the Exhibition held last month at Grosvenor House by the Radio and Electronic Component Manufacturing Federation or, rather, to the stand of Thermo-Plastics, Ltd. there, reminded us of the great strides made by the so-called contact resins—the polyester resins—the descendants, so to speak, of the alkyd resins that have been

used by the paint industry for 20 or 30 years. It does not need great intelligence, in even the casual observer, on handling the products of glass fibre bonded with these resins that we saw on the aforesaid stand—radomes, helmets, and so on—to realize that in them we have structures of immense strength. It was in 1942 or 1943 that a Canadian brought to this office a sample of the famous C.R.39 resin (made from allyl alcohol) in the form of a "glass"-like cast sheet. It was only a few years later that we first saw a radome and a dinghy made from glass fibre bonded with polyester resin made in this country.

The visit to the Show also reminded us of a paper recently read before the Society of Plastics Industry Inc., U.S.A., in March by Mr. J. S. Finger, Chairman of the Reinforced Plastic Preparedness Committee and President of the Corrolux Corporation of Houston, Texas. It would appear that the name "Reinforced Plastics" used by the author, referred only to the glass-fibre/polyester combination. Theoretically and technically, this is a pity, since the phenolic laminates have at present a much wider employment and are much more readily available at a lower cost, and their future in many directions assured.

Nevertheless, the polyester resins are in a class by themselves, and Mr. Finger's opening sentences: "Reinforced plastics bear the same relationship to other plastics as uranium does to metals; their importance is far out of proportion to the tonnage consumed," may be considered as half exaggeration, but understandable, and half very much real truth. What is a revealing fact is that nearly £20,000,000 worth of radomes (the housings for airborne and land-based radar equipment) has been made from glass-bonded contact resins in the U.S.A.

The present interest lies in possible developments for rearmament, rather than in the peace-time productions which have grown up in the past few years and range from electrical tubing to luggage cases, boats to artificial limbs, chemical piping to washing-machine structures, and window structures to impregnants for porous castings.

The war-time developments have already been indicated in the production of radomes, but heating ducts, tank liners, aircraft blades, ammunition boxes, rocket tubes, pontoon bridges, gunstocks, life-floats, and sledges have all been fabricated.

MOULDING POWDER AND SHOT

Bigger and Better

It was my delight recently to run down to Walthamstow, at the invitation of Mr. Herbert Bridge, to see the latest masterpiece of British Moulded Plastics, Ltd.—the 32-lb. moulded cabinet in plastics for the new Sobell Television Console. Hence page 119 of this issue. The cabinet is a beauty and a staggerer for size, and I am sure is the pride of at least two hearts, Mr. Bridge's and Mr. Middleditch's, who did so much in the designing of it. The latter referred to the 32 lb. of "pellets" used in the moulding. As each "pellet" is about 3 ins. by 2 ins. by 1 in., I expected, while watching the operators filling them in the mould, that somebody would take a trowel and slap a bit of cement on them. However, nobody dropped any bricks. I suppose their size, and that of the moulding, is another indication that compression moulding in sheer weight of units produced, is still well ahead of injection moulding in spite of recent phenomenal advances in the latter technique.

* * *

Cutting Styrene Cake

Another indication that the whole of the future output of the styrene to be made in this country will not automatically be diverted to polystyrene manufacture for the plastics moulding industry (or to the paint industry) lies in the news that Lotus, Ltd., the well-known manufacturers of "Lotus" and "Delta" shoes, are producing women's and men's shoes with soles made of natural rubber compounded with a styrene copolymer. The raw material styrene is imported presumably from the U.S.A. Results have proved eminently successful, so that I hope the British styrene cake will eventually prove large enough to withstand considerable slicing up.

* * *

High Pressure Work

I have just read an interesting paper on high-pressure physics by the well-known Harvard physicist Professor P. W. Bridgeman in that excellent publication "Endeavour." In it he describes the changes that occur in certain elements, e.g., bismuth, gallium, etc., which under pressures of the order of 12,000 atmospheres (about 75 tons per sq. in.) up to 90,000 atmospheres are transformed into "new" metals (e.g., melting points increase). At these high pressures, yellow and red phosphorous are transformed into the black variety and carbon bisulphide, ordinarily a highly volatile liquid, is transformed into a permanent black solid, denser than the elements from which it is made. These strange transitions, of which little is known theoretically, are doubtless due to rearrangement of electronic orbits. So far as the moulding of thermosetting resins is concerned, I do not think we need hope, because of the appalling cost involved, that we have much chance just yet of increasing the strength of our mouldings by inducing secondary bonds in the resin to do their stuff more efficiently.

* * *

Packaging for Arms

At a recent luncheon given by the Waste Paper Recovery Association, Mr. J. Freeman, Parliamentary Secretary to the Ministry of Supply, said that the figures showing the loss of war materials during the last war through bad paper packaging had given him a great shock. Of the new equipment sent to spheres outside Europe about 60 per cent. of accumulators were unusable; as too were 40 per cent. of the boots and between 60 and 95 per cent. of aircraft instruments. About 90 per cent. of cathode tubes sent over on D-Day were unserviceable. Not a pleasant story! This was two years after I had read a secret report, which made me shiver, of the damage done by the elements, insects, fungi and bacteria to the equipment of the Australian forces in New Guinea. Thank Heaven the plastics industry has produced a big range of materials to make such losses negligible. Let's hope that the authorities will use them without stint.

* * *

Acetate-Butyrate Out ?

The reference to the new important economic activities of Erinoid, Ltd., given on another page in this issue, reminds me how far this company has gone in the 25 years I have known it. The remarkably fine research and technical laboratories, greatly strengthened in their staff, have been very busy. One of the achievements has been the production of a specially formulated cellulose acetate moulding powder, that for all the purposes in which it has been employed so far, is as good in its physical properties (e.g., dimensional stability at very low temperatures) as cellulose-acetate-butyrate. It has been tested during the past year and more, in some of the big moulding shops, especially for the heavy covering of metal cores of steering wheels for cars destined for use in very cold climates. Acetate-butyrate was formerly a "must" for this job and since none at all is produced in Gt. Britain, the new cellulose acetate is in truth a dollar saver. Research work on polystyrene, of course, proceeds apace, and it would not surprise me if forms other than moulding powder were made available.

DOGSBODDY.

Fig. 1.—Glove liners on porcelain "hand" moulds or formers, prior to dipping.

Protective Clothing

*With Special Reference to the Art and Science of Industrial Glove Making, as Practised at the Works of James North and Sons, Ltd., Hyde, Cheshire.**

GLOVE making is one of the most ancient of crafts, and it is a moot point whether it was first employed for protection or mere ceremony, for warmth or decoration. Homer describes Laertes as wearing them in the garden; hawking was an ancient pastime and the steel gauntlet one of the earliest of protections in war.

The coming of the Industrial Revolution, with its new industries, created new hazards for workers, and with the enormous growth of the iron and steel industries, chemical production and electrical invention in the late 19th century, there grew also awareness of the need for protecting workers or those using the new products. To-day the production of protective clothing for manifold purposes is an industry in itself and has created a demand for new materials, not only for glove making, but also for complete clothing, ranging from leather gloves palmed with steel "studs" for heavy manual labour such as barrel rolling, to asbestos clothing for metal and fire-fighting workers and rubber for surgical work. The chemical industry more than any other has been responsible for the advances in this field, for it must protect its workers against splashes of acids or alkalis and other corrosive and harmful liquids and against the inhalation of dangerous gases; hence the introduction of gas masks, eye-shields and helmets, special boots and coats.

To-day, the plastics industry lends new strength to such endeavours, for with its own array of new materials, with especially high acid resistance in some, of transparency in others or, alternatively, of great strength and fire-resistance, and withal in forms that are readily mouldable or in sheet, hard or flexible, it is providing even greater safety for our growing industries.

James North and Sons, Ltd., of Hyde, Cheshire, is an old company that has long specialized in the manufacture of gloves, using the traditional leather and fabric as its basic raw materials. It is less than five years since its directors, realizing the importance of polyvinyl chloride and similar polymers, with their outstanding resistance to acids, to many oils and other liquids, their resistance to wear and the ability to transform them with flexible coatings and sheets, decided to erect an entirely new section in their existing factory, devoted entirely to the production of gloves and clothing

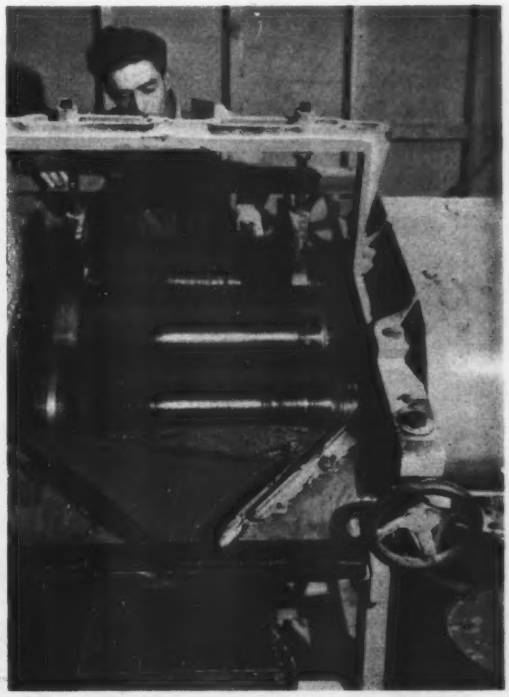


Fig. 2.—Mill for pigmenting the p.v.c. paste

*Protected by patents in U.K. and most foreign countries.

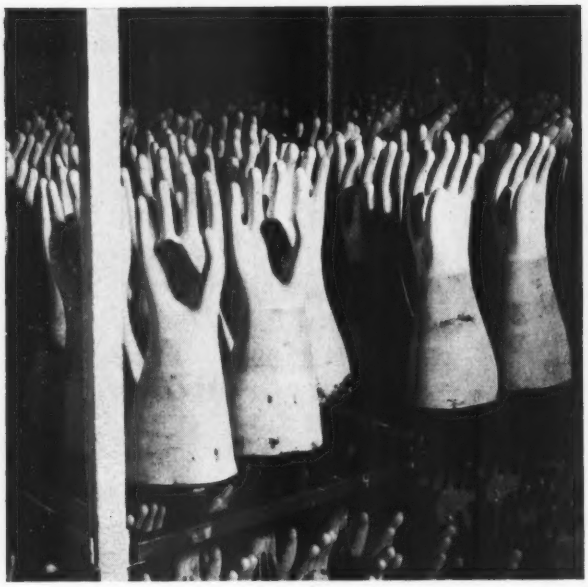


Fig. 3—Porcelain "hand" moulds or formers.

Fig. 4—Slipping the liners on to the formers.

made from them. During these few years, progress has been rapid technically and economically, and to celebrate the success, the company recently invited its friends to visit the works.

Perhaps the most remarkable fact that strikes one in these works is the astonishing juxtaposition of old craftsmanship, as carried out in the old section of the works, and the mingling of the high standard of modern technology with craftsmanship in the new. Yet this is not so astonishing on second thoughts, for craftsmanship, happily, is also the basis of the new. Indeed, the old craftsman may think, with reason, that leather and fabric will always be with us and the new clothing is merely the old with a new coating!

The polyvinyl chloride is employed in the paste form, that is, by compounding with high plasticizer content. The choice of plasticizer varies with the final use of the glove or clothing. Thus, for acid resistance, tricresyl phosphate is employed, whilst for use in food factories the p.v.c. is blended with di-octyl phthalate. The first main operation on the paste is to ensure proper dispersion of any portions of gel present, which is accomplished by passage through a vibrating filter or sieve. This is followed by pigmentation by milling the paste on a grinding mill, the pigments being red oxide for normal requirements and titanium oxide for the white gloves used in food handling. The pigmented paste, carefully controlled for viscosity, is then loaded into the dipping tanks.

Fig. 5—Draining excess p.v.c. paste from the dipped gloves.

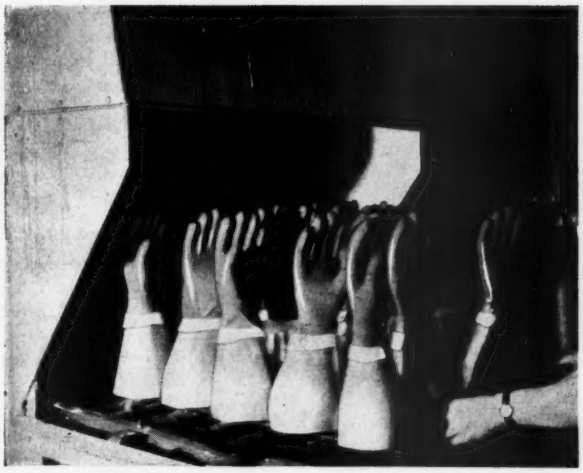


Fig. 6.—Dipped gloves entering the curing oven.

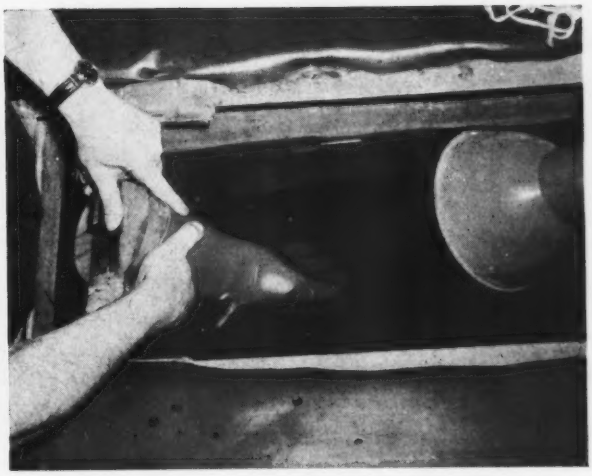


Fig. 7.—Pressure testing of gloves for pinholes.

At the same time a parallel flow-line manufactures and prepares the glove liners for the dipping process. The liners, glove- or mitten-shaped, are of closely woven cotton fabric and are stretched on porcelain "hand" moulds. A vast number of these moulds are used and movement through the factory is on a roller conveyor system.

The liner-covered moulds then pass to the dipping section of the factory, a batch process of approximately 24 per dip being the unit batch. The moulds are held in a special holding frame and are lowered into the paste tank to a predetermined depth so that all of the liner, except for about 1 in., is coated with the p.v.c. paste. The frame is then removed and passed to a draining tank where excess paste is collected and pumped back into the dipping tank for re-use.

After complete draining the frame is passed to the curing ovens maintained at about 300-450 degrees F., when complete gelling takes place. The frames pass out of the oven, when the gloves are stripped for their final trimming. It is also important to note at this point that every glove produced is tested for the quality or degree of coating, that is, for the presence of pinholes, by subjecting each to an air-pressure of 20 lb./sq. in. while immersed in water. In all, some 40 different shapes and sizes of glove are made for men and women, according to the size of the hand, length required and in the glove or mitten form.

General industrial clothing of various types is now also a large manufacture by the company. For this purpose p.v.c. coated fabric is produced on large spreading machines in which the heating is carried out by high-pressure steam chests. Here again the basic fabric is closely woven cotton upon which is spread p.v.c. paste, the thickness being controlled by a doctor knife. Gelling is completed by passage of the coated fabric through the heated chambers, the finished coated fabric being inspected for flaws prior to reeling.

It is from this fabric, by what is virtually expert tailoring, that a variety of jackets, coats, caps and hats are produced, some of the latter, as will be seen from the photographs, being fitted if required with vizors or goggles of cellulose acetate or "acrylic" sheet. Normal stitching with cotton or other fabric is avoided, special threads being employed and the resulting seams sealed; welding by high-frequency machines being the general method of attachment.

Fig. 8.—Spreading machines producing proofed cloth, subsequently to be made up into clothing.

Fig. 9 (left).—Cutting p.v.c. proofed cloth for making up into garments.

Fig. 10 (below).—Seaming the garments by H.F. heating.

It is interesting to mention that an excellent chemical and physical laboratory, under the control of Mr. H. Grimshaw, has been built in this factory with its history of craftsmanship, and in it the visitors to the factory were shown in a very practical manner the resistance the p.v.c. coated products possess against strong nitric acid and other liquids.

The visitors were entertained, following the visit to the works, to a lunch, at which the governing director, Mr. G. K. White, stressed the great help given them by the producers of p.v.c. and plasticizers. In reply, speeches by the visitors, who included Mr. Delafield, of British Geon, Ltd., Mr. Renfrew, of I.C.I. (Plastics Division), Dr. Kroch, of Lankro Chemicals, Ltd., Mr. Ferris, of A. Boake Roberts, Ltd., Mr. Dunn, of British Industrial Solvents, Ltd., Mr. Jones, of The Geigy Co., Ltd., and the technical Press, it was even more strongly stressed that the directors of the company had little need for technical help from outside other than special "know-how" regarding the p.v.c.—which was all very pleasing and very true.

For our own part we beg to thank the Directors of James North and Sons, Ltd., not only for a very instructive and pleasant visit, but also for the details in the foregoing notes.

Fig. 11.—A range of the finished gloves, mittens and protective clothing.

Fig. 12.—Two examples of protective head gear.

The Sobell Television Console Cabinet

The four photographs published here (together with that of the 1,500-ton press shown on our contents page) tell the story of the production of the cabinet for the Sobell television console by British Moulded Plastics, Ltd. It is of phenolic moulding material, weighs 32 lb., and both from the point of view of design and of moulding technique is a production of outstanding merit

Fig. 1 (above).—The two operators have just taken the load of pelleted phenol-formaldehyde moulding powder from the high-frequency heater on the right. The tray of "pellets" has been put on the little "railway" leading to the press which can be seen in the left background.

Fig. 2 (above).—The operators are loading the preformed pellets of moulding powder into the mould.

Fig. 3 (above).—The moulding has been lifted from the press and placed in a fixture on the bench. The two operators are tapping in the four metal inserts while the moulding is still hot.

Fig. 4 (right).—The moulding is being placed on the second fixture, which will maintain its shape while it cools. The moulding previously removed from the press is seen in the foreground, on another fixture.

This exceptionally large precision job was on view at the stand of British Moulded Plastics, Ltd., at the recent Exhibition held at Grosvenor House, London, by the Radio and Electronic Component Manufacturers' Federation.

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"Durestos" Felts—Experiments in Moulding Without Pressure

By GEORGE MAY

This article describes a series of practical experiments which were made to bridge the gap between theory and practice, and indicates possible new uses for plastics in the hands of the craftsman.

RISING prices and shortage in supply of raw materials used in traditional processing by British industry have done much to influence the thorough investigation of synthetic products relative to particular material requirements.

Motorcar manufacturers are no exception to this trend and during a former steel famine, with its obvious retarding effect on productive effort, Sir Rowland Smith, of the Ford Motor Co., Ltd., requested chief body engineer Mr. Westcott to go into the technical possibilities of making a motorcar body from materials other than metal. From known factors it was calculated that a plastic car body should also be lighter than one made from pressed steel, and this, in turn, would be an advantage in providing an increased mileage per gallon on the fuel consumption of the vehicle.

The idea of making a car body from plastics is far from being a new one, and in the mind of many an inventor was already regarded as an accomplished fact providing he had the financial backing to apply his theories in practice. It would be no great hardship for an industrialist to bear the development cost of one such scheme, but considering the potential number of possible combinations of synthetic and reinforcing materials which are available, an estimation of the expenditure required to produce such a range of prototypes would alarm the financial department of any organization. It would be necessary, therefore, to carry out a certain amount of low-cost experimental work on a smaller scale, in order to produce evidence to justify full-scale, specific development.

The writer's own contribution to the Ford investigation was based on applying his practical experience in using a unique combination of synthetic resin and asbestos fibre; and by discovering properties not originally apparent to the manufacturers of this material.

"Durestos," made by the Turner Brothers Asbestos Co., Ltd., of Rochdale, is available as a pliable felt in three grades and various thicknesses. The amazing strength properties of this material when moulded at pressures of from ¼ to 1 ton per sq. in. are already well known. Further, the felts have also been successfully laminated by low-pressure moulding, using the rubber bag technique.

"Durestos" felts consist of long-fibre asbestos incorporating water-soluble phenol formaldehyde resin. They are supplied with the resin uncured, so that the material may be processed by the consumer, applying heat and pressure.

Compared to other fibres used for reinforcing purposes, asbestos may be regarded as inert, shrinkage being negligible, and a few simple tests showed that "Durestos" was a medium likely to overcome the great obstacle of applying the pressure normally required in curing thermo-setting plastic structures over the dimensional limits which can be accommodated by established moulding processes. It is important to note, however, that, in common with the type of resin with which the felt is impregnated, the shelf life of the material is limited, and it ages gradually from a limp and tacky condition to a semi-rigid and dry state.

Freshly resinated felts, applied to prepared plaster moulds, were found to be in excellent condition for manipulating to double curvature shapes. The material yielded readily to stretching by hand, and the strong tack of the resin enabled laminates to be built up, assisted by local pressure from rubber-gloved hands, rollers, squeegees and leatherworker's tools, which were used as the contours of moulds demanded.

Several small structures made in this way produced well-bonded laminates, after being cured in an electrically heated oven, starting from cold and gradually reaching the temperature required for the complete cycle. No pressure was needed, and the results encouraged more ambitious experiments.

To obtain further information on the practical properties of plastics compared with pressed steel, it was then decided that a car-door panel should be made, a complete door from a Ford "Prefect" serving as a model. To do this several layers of freshly made "Durestos" felts were dressed down over the outside surface of the door, which had previously been prepared with wax, and the assembly was then heated until the laminate was completely cured. This produced a rigid and stable former, which separated readily from the original door.

After this structure had been treated with a wax parting agent, a three-ply laminate of "Durestos" felts was dressed down by hand on to it, and cured, without any pressure. This

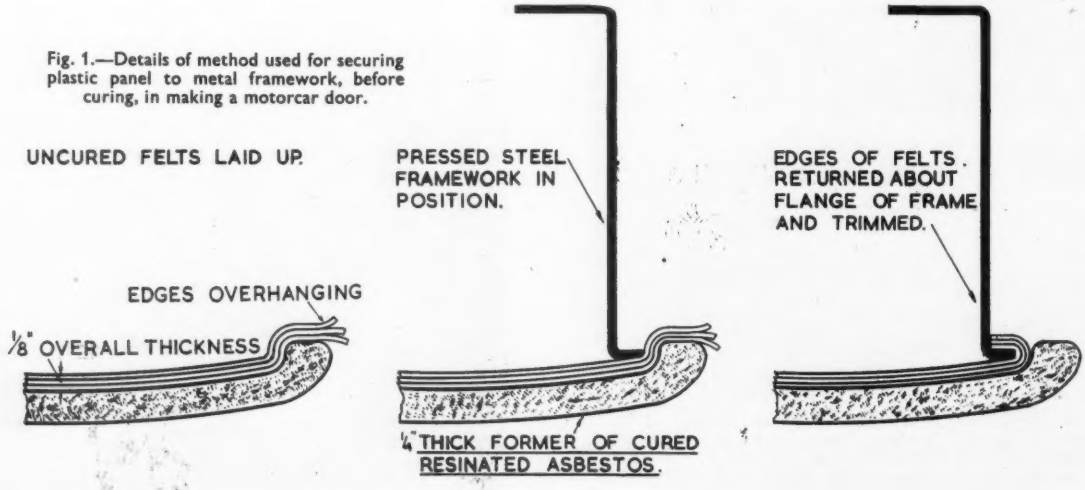

UNCURED FELTS LAID UP.
EDGES OVERHANGING
⅛" OVERALL THICKNESS
PRESSED STEEL FRAMEWORK IN POSITION.
¼" THICK FORMER OF CURED RESINATED ASBESTOS.
EDGES OF FELTS RETURNED ABOUT FLANGE OF FRAME AND TRIMMED.

Fig. 1.—Details of method used for securing plastic panel to metal framework, before curing, in making a motorcar door.

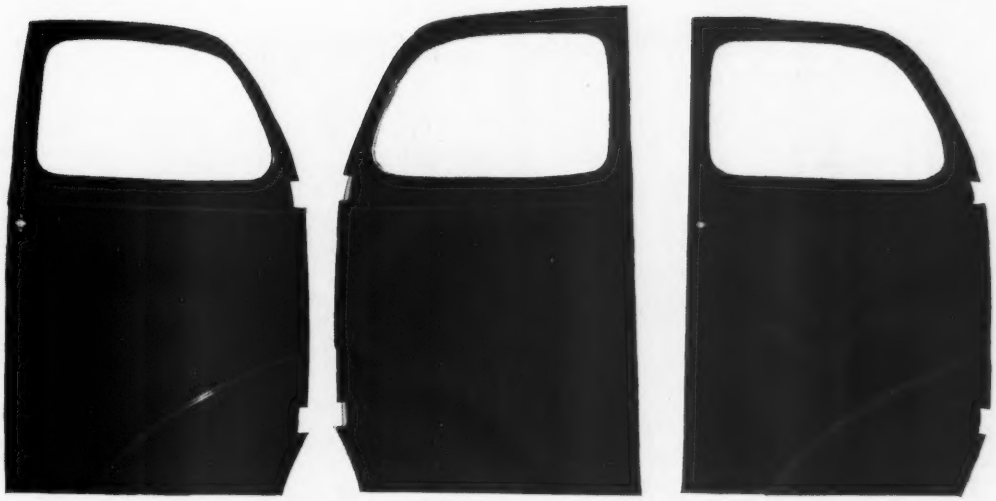


Fig. 2.—Development for Ford "Prefect" motorcar door, using resin-impregnated asbestos felt cured without pressure. The central former is an impression taken by contact from the metal panel (left) to produce the plastic panel (right).

provided a synthetic panel which weighed 4 lb. 15 oz. as compared to 9 lb. 14 oz. in metal. In addition to the weight-saving factor, preliminary tests also showed that the plastic panel had more favourable acoustic properties and would not require the treatment to dampen the "drumming" effect of vibration, which is necessary with steel panelling.

The original moulded panel, however, appeared to be of little practical value when dealing with possible methods of fitting to the door framework, which incorporated a glass window panel together with winding mechanism. Adhesives were not considered ideally suitable for this purpose, and a simpler approach was made by preparing a further "Durestos" panel on the original former.

When the felts had been laid up, the door framework (complete with accessories) was placed in position and the overhanging edges of the uncured material returned around the metal flange, as shown in Fig. 1. After curing, the effect produced a complete door assembly, ready for finishing and hanging.

At this stage, and with the easing of the steel supply position, it was difficult to assess how much the cost-conscious manufacturers of mass-produced cars would be likely to be influenced by the suggested use of plastics for body building, but at least a certain amount of useful information was apparent.

While the moulding of the "Durestos" was carried out without pressure, mainly in the interests of economy, three important points are clearly indicated from the experience gained by experimental manipulation. First, it would seem that the most practical approach to the manufacture of a synthetic car body would be to combine the main area in plastics with a metal framework. Secondly, as demonstrated by the experimental work in using resinated felts moulded without pressure, a further point on the credit side is that prototypes of new designs could be made from simple plaster moulds at comparatively low cost; this advantage, indeed, should be of particular interest to companies which manufacture short runs of specialized models. Thirdly, the combination of resin and asbestos fibre produces a laminate which is not only light and strong, but one which also defies corrosion, the enemy of metal coachwork.

This work, which was at first commenced in the interests of car bodies, had more immediate and rapid development in relation to the human body. Visits to the Royal National Orthopædic Hospital, Stanmore, and to Queen Mary's Hospital, Roehampton, made the writer extremely conscious of the great need for desirable improvements over plaster in making rigid splintage, moulded to the individual requirements of each patient. At the request of Dr. J. T. Scales, M.R.C.S., L.R.C.P., in charge of the Plastics Research Unit of the Institute of Orthopædics, a programme of practical experimental work was carried out by the author, original examples of which are shown in Fig. 3.

The first demonstration of splintage made by pressureless

Fig. 3.—Spinal jacket development. Left to right: Plaster-bandage cast as taken from patient; resin-impregnated asbestos former made from inside of cast; and plastic jacket moulded on outside of former.

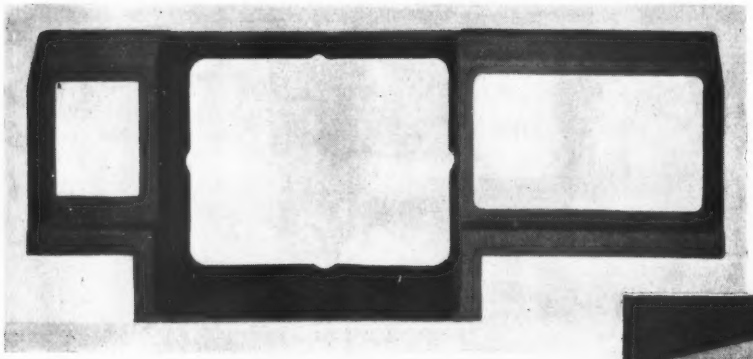


Fig. 4 (left).—Another example of moulding without pressure—a deeply recessed panel for the " Deccola " automatic record player, finished by spraying with rayon flock.

moulding was a spinal jacket. This was executed in two stages, first a hand-moulded resin-impregnated asbestos former was made from the inside of a plaster bandage casting; when cured and removed from the plaster, this former was waxed over on the outside to receive a three-ply laminate of " Durestos." This, in turn, was cured to provide a jacket, lighter and stronger and in every way preferable to the original plaster cast which normally would have been used.

Further examples, made directly from plaster casts, proved to be equally satisfactory, and the moulding of " Durestos," without pressure, is now being more extensively applied to hospital work. Its most imporant feature is that it supplies a long-felt need for a means of fabricating moulded structures which are required in great quantity, in each case no more than one moulding being called for.

Compared with moulded leather splints, which require steel reinforcement, production costs of " Durestos " splints are approximately half. The resinated asbestos products are washable, non-inflammable and, because of their thermo-setting nature, they do not distort with use.

The manufacturers of " Durestos " are to be congratulated on providing a material, which, when manipulated and shaped, can be controlled to " stay put " during the hardening process without the need to apply any pressure. Freshly delivered resinated asbestos felts have been found to provide consistent and well-bonded laminates for pressureless moulding, but eventually a stage was reached when it was appreciated that this condition could not always be relied upon, owing to the limited shelf life of material held in stock.

Experiments were made with uncured felts of varying age in order to establish the best method of reviving them to a limp and workable condition. By spraying the material with water, it was thought that such treatment would replace moisture lost by evaporation, and a certain amount of success was obtained with felts which had been in stock only a few months. The limp condition and resin tack were reclaimed to a state approximately equal to freshly resinated felts, and well-bonded laminates were produced.

Felts over six months old, however, did not respond to this treatment, as the resin no longer appeared to be water-soluble. The effect of wetting was merely to soften the felts; it left them without any appreciable adhesive value. In process of curing laminated sections, generated steam caused blistering and delamination. The water treatment, therefore, could not be considered as being satisfactory to deal with felts of varying condition.

It was later discovered that the spraying of " Durestos " with industrial spirit was the most satisfactory way of reviving older felts to the preferred state, and in overcoming the disadvantages of using water.

Apart from the success of pressureless moulding in orthopædic work, many interesting industrial problems have been solved by applying the same technique. In particular, two main features are that the use of resinated felts has considerable advantages over the pâpier-mâché, laminated paper, and similar processes, while structures exemplified by the cabinet-making industry possess greater stability than those made from natural timber.

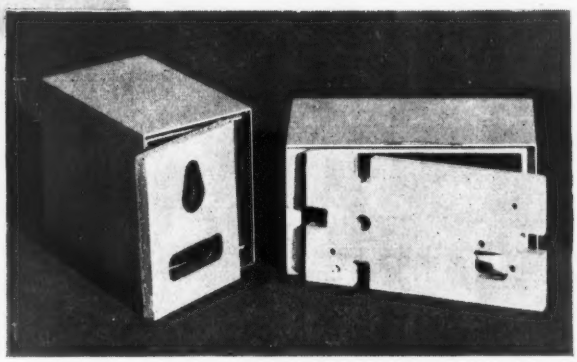


Fig. 5.—Calendered resin impregnated felt, cured without pressure, make excellent skins for sandwich construction. In these insulated cabinets for apparatus operating at controlled temperatures, an " Ozanote " core is laminated between sheets of resin-impregnated asbestos, the tight fitting lids being cut to accommodate ceramic terminal blocks.

Felts calendered on to prepared metal sheets have also been cured without pressure. When separated from the metal in the form of rigid panels, they have proved suited for use as " skins " for lightweight sandwich constructions.

It is significant that the Royal Aircraft Establishment at Farnborough, alive to new developments and processes needed to meet advances in aviation, have adopted the writer's original work as the basis for the R.A.E. no-pressure process. Information published by permission of the Chief Scientist, Ministry of Supply, indicates that the Plastics Department of the establishment recommends the modification of using Aerolite 185 (a commercial resorcinal-formaldehyde glue) for bonding " Durestos " felts. This produces laminates with increased strength, and suggested applications for aircraft include the use of the process for developing plastic structures such as spars, ribs and internal bulkheads.

In the writer's opinion, the success of pressureless moulding is dependent mostly upon skilful manipulation. The progress of science and scarcity of rare and carefully seasoned timber have both, to a certain extent, been responsible for lowering the percentage of craftsmen with creative ability. It is therefore most encouraging to have evidence that the plastics industry can contribute yet another medium for the revival of real craftsmanship. For example, one has only to see the work of a skilled operative like Mr. Tom Fisher, at Stanmore Orthopædic Hospital, to appreciate that mouldings of limitless variety can be produced.

There is no doubt that " Durestos," cured without pressure, can be employed for an ever-increasing number of purposes, not only as a moulding material, but also for the moulds.

The writer would like to acknowledge that he was enabled to carry out the experimental work described in this article by facilities made available by the directors of Dufay-Chromex, Ltd., Elstree, Herts.

Plastics in Building—VIII

Sound Absorption and Sound and Thermal Insulation

By JOSEPH B. SINGER, B.Sc.(Arch.), A.R.I.B.A.

THE problem of acoustics is of fundamental importance in many buildings, such as lecture halls, law courts, committee rooms and concert halls. The object of acoustic design is to ensure the clear reception of speech sounds, to enhance the quality of musical tone, and to minimize the incidental noise that may interfere with the principal source of sound. The transmitted sound is aimed to reach the listener clearly and crisply, to be of adequate volume, and have a good balance between high, middle and low frequencies. A sound which originates in a room with hard-finished reflecting surfaces is reinforced by reflections or echoes between walls, floor and ceiling; optimum conditions are achieved in appropriately shaped rooms, where the best use is made of direct and reflected sound rays, and through the employment of suitable sound-absorbent materials.

The most common sound-absorbing materials are of a porous nature, and these are found to be particularly efficient at the high-frequency end of the musical scale. Furnishings, such as upholstered chairs, cushions, carpets, and even the clothing of the audience act in themselves as sound absorbents, thus causing a diminution in value of the higher frequency range notes. This effect is counteracted by the installation of "vibrating panels," which act as low-frequency sound absorbents; these panels are in the form of mounted plate or sheet materials, with air spaces between them and a solid backing. The weight of the panel and the thickness of the air space affect the absorption, and maximum values are obtained at one characteristic sound-frequency which is called the resonance point. The sound-absorption efficiency can be further improved, and the resonant-frequency range suitably adjusted, by the insertion of a porous absorbent material in the air space. Experiments in this field have also demonstrated that composition or laminated sheets produce a less sharp resonance peak than homogeneous panels.

Acoustical boards produced from specially processed glass fibres treated with phenol-formaldehyde resins are manufactured in America. The fibre-glass boards are in the form of panels 48 ins. by 24 ins. by 1 in. thick, and are used mainly for suspended ceilings. The weight of the panel, which is grooved and bevelled in a regular pattern to resemble tiles, is 0.75 lb. per sq. ft. Such panels are suspended from solid ceilings by means of Tee-shaped metal sections with hoop-iron hangers or other suitable supports.

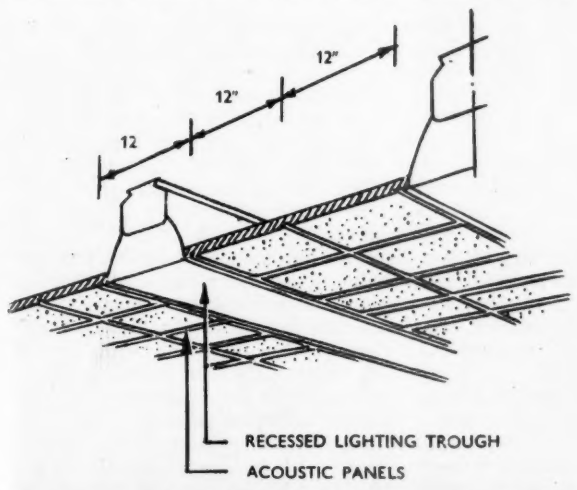


Fig. 1.—Diagram showing fibre-glass panels for acoustic ceilings as installed in offices of Owens-Corning Fiberglas Corp., U.S.A.

The incorporation of recessed lighting troughs can be an interesting feature of the acoustic ceiling; the lighting troughs are spaced at 36 ins. centres and the panels rest on specially designed flanges, as shown in Fig. 1.

According to data published by the Owens-Corning Fiberglas Corp., the light-reflection coefficient of these panels is between 0.75 and 0.80, and their sound-absorption coefficients are as follows:—

Cycles per sec.	128	256	512	1,014	2,043
Sound-absorption coefficients	0.67	0.67	0.62	0.89	0.91

Sound-proofing of the "anechoic chamber," originally built at the Illinois Institute of Technology for the purpose of research on sound absorption, is another example of application of glass-fibres impregnated with phenolic resins. This experimental room, 15 ft. by 12 ft. and 6.5 ft. high, was studded with 2,500 resin-impregnated glass-fibre wedges, which were 8 ins. wide at the base and 24 ins. long. The room was built inside a concrete-walled chamber lined with 2-in. glass-fibre slabs and separated with an air cavity 2 ft. wide. Similar testing chambers are now used in England by the G.P.O., where the wedges—bonded with "Bakelite" resin—are placed in boxes covering the entire interior surface of the room.

A perforated facing sheet backed with a porous material is an alternative type of sound absorbent to solid panels. The amount of perforation does not affect the sound-absorption efficiency until the frequency of 500 cycles per sec. is reached, above which the efficiency falls with the percentage of the area removed from the facing. The object of the facing

Table 1

Materials	Absorption coefficients (c/s)				
	125	500	1,000	4,000	Mean Coeff.
1-in. "Holoplast" panel with enclosed kapok strips and one side perforated	.30	.55	.90	.50	.56
Fibre-board tiles (perforated)	.13	.99	—	.50	.54
Double 3 mm. plywood (5 cm. spacing filled with wadding)	.70	.25	—	.13	.36
Double 3.5 mm. hardboard (5 cm. spacing)	.23	.15	—	.05	.14
Brickwork (plastered)	.013	.03	—	.05	.031

(Reproduced from N.P.L. reports on "Holoplast" and from Post-War Building Studies No. 14, published by H.M. Stationery Office.

Table 2

Materials	Thermal conductivity (k) B.Th.U. per sq. ft. per hr. per °F. per 1 in.	Sound-absorption coefficients in cycles per second
1-in. "Holoplast"	0.95	—
1-in. "Holoplast" filled with slag wool	0.8	—
1-in. "Holoplast" filled with expanded rubber	0.52	—
"Dufaylite" bonded on one side to a sheet of resin-bonded wood-pulp and asbestos-fibre board, and on the other side to a ¼-in. hardboard	1.25	—
"Dufaylite" filled with vermiculite	0.70	—
"Onazote"	0.2 at 4 lb./cu. ft.	0.3 to 0.35, at 500
"Thermazote"	0.28 at 8 lb./cu. ft.	0.45 to 0.50, at 500
"Rubazote"	0.33 at 14 to 16 lb./cu.ft.	0.30, at 500
"Isoflex"	0.28	—

material is to reduce the higher frequency absorption of the porous material. The nature and the method of fixing of the porous material also contribute to the resultant effect; for instance, an air space of 1 in. and upwards between the porous material and the solid wall increases the absorption efficiency.

Æsthetically, the regularly perforated wall or ceiling surface gives an interesting texture. Slotted facing, or larger but more sparsely distributed perforation, could enrich it and be probably more effective when viewed from a distance, as on high ceilings.

"Holoplast" acoustic panels are manufactured with one face perforated by $\frac{1}{8}$-in.-diameter holes at $\frac{1}{2}$-in. centres, and the cavities are filled with kapok enclosed in scrim cloth. Table 1 indicates the comparative sound-absorption values of "Holoplast" and other materials. "Holoplast" acoustic panels were used in cinemas on the liners "Queen Mary" and "Caronia," owing to the rigidity and the high absorption coefficient value of the perforated plastics, which were considered superior to other materials available.

The choice of a suitable finish for the recently built Royal Festival Hall was dictated by consideration of the material which would satisfy æsthetic as well as practical requirements. The material was expected to have a finished decorative surface of lasting quality and one which would not necessitate frequent attention. More conventional types of panel did not conform to L.C.C. fire-resistance regulations, applicable for public buildings, and the hygienic surface and good acoustic absorption further determined the choice of plastics for foyer ceilings.

The perforated plastics sheets, manufactured by Holoplast, Ltd., are 4 ft. by 2 ft. by $\frac{1}{8}$ in. thick, with 2 ins. of rockwool in muslin bags laid on top. Any irregularity in the surface of a large area of this highly finished material would be very apparent, and particular care had to be taken in aligning the sheets on metal angles. The sheets are fixed to these angles with self-tapping screws at 6 ins. centres, and suspended from concrete ceilings on hoop-iron hangers.

Sound and Thermal Insulation

Sound insulation, as distinct from sound absorption, is a term used to cover the insulation of buildings against noise generated from within or from outside the structure. With increase of the noise nuisance, particularly in large towns, sound insulation has become one of the basic requirements in a building. The exclusion of noise, by the use of appropriate insulating materials, will be discussed in conjunction with thermal insulation, since these two factors in building design are often interwoven, and the use of one material has frequently the object of fulfilling both purposes.

The cellular nature of plastics laminates, such as "Holoplast" or "Dufaylite," provides a certain degree of insulation,

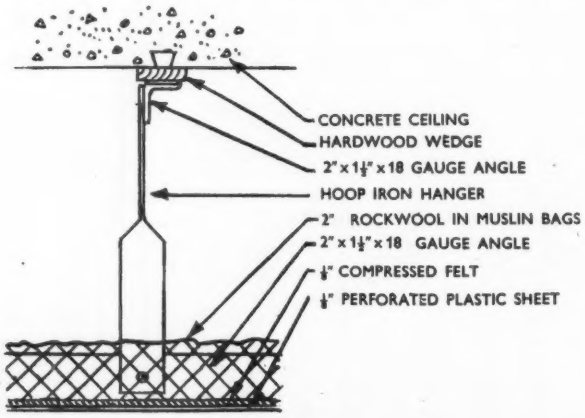


Fig. 2.—Constructional details for acoustic ceiling for the foyers of the Royal Festival Hall, London.

but this is usually improved by filling the cavities or cells with other materials, as shown in Tables 1 and 2.

The possibility of manufacturing foamed cores for use with sandwich-type panels, as well as infilling to cellular plastics, should be a subject of further investigation. Considerable improvement in insulation properties could be envisaged from a laminate built up with two rigid sheets and a foamed core. Lightness, low moisture absorption, and fire resistance compare favourably with traditional equivalents.

Although almost every type of thermoplastic and thermosetting resin has been successfully foamed, only five types are produced on a commercial scale, and these, so far, have been little used in building. Far more progress has been made in America, where sponge rubbers and other elastomers, as well as polystyrene, phenolics, ureas and vinyl foamed plastics are manufactured. The open cell non-rigid sponge rubbers have only a limited application to upholstery and vibration dampers, but the closed-cell type is suitable for gaskets and sealing-sheet materials used externally. The closed cell rigid type expanded rubbers have good mechanical properties and water resistance. Polystyrene foams have better insulation value than cork, but have low compressive and tensile strengths and are rather brittle. Similarly, vinyl foams have a low compression strength. Phenolic foams are superior to the former types in their resistance to high temperature, low flammability and excellent water and chemical resistance; hence it can be expected that phenolic foams should appear in the forefront of low cost thermal and sound insulating plastics materials.

At present the foams are produced in varying densities from 0.6 to 5 lb. per cubic ft., with thermal conductivity values from 0.20 to 0.28. Phenolic foam products are also produced in densities from 12 to 20 lb. per cubic ft., and are supplied in slab form. Another insulation material manufactured from a blend of water-soluble acrylic, vinyl, and urea resins, has a density of 0.8 to 1.5 lb. per cubic ft., and its shredded mass can be used for filling the cavities of cellular plastics and similar applications.

In this country an expanded material is produced by the Expanded Rubber Co., Ltd., under the trade name of "Onazote." It is manufactured in various standard sizes, such as 3 ft. by 2 ft. ($\frac{1}{4}$-in., $\frac{1}{2}$-in., $\frac{3}{4}$-in., or 2-in. thick) and 3 ft. by 1 ft. (1-in. or 2-in. thick), the weight varying from 4 to 30 lb. per cubic ft., depending on variations in density. These boards have a smooth, black surface, which can be painted with a lead-free paint. They can be faced both sides with plywood, plastics or other sheet materials, either flat or curved, and cut or sawn to required sizes. Their application is envisaged as prefabricated panels for walls, floors and ceilings.

Expanded thermosetting synthetic resins ("Thermazote") are also produced by the Expanded Rubber Co., Ltd., in form of 2-ft. by 1-ft. boards (1-in. thick), weighing 8 lb. per cubic ft., which can also be faced and used for panels, doors, etc.

Soft expanded rubber ("Rubazote") belongs to the flexible and loose-fill group of insulating materials. This material is produced in rolls 3 ft. 6 ins. wide, 20 ft. long, $\frac{3}{16}$-in. thick, and pads in 3 ft. by 2 ft. ($\frac{1}{8}$-in. to 1-in. thick). This material has a smooth, buff surface and can be cut with a wet knife or sawn with a fine-tooth band-saw. It is fixed with special rubber adhesives for sound and thermal insulation, and vibration damping.

A multilayer insulating material, composed of layers of corrugated cellulose acetate film, alternating at right angles to each other, is available under the trade name of "Isoflex." This material is manufactured by BX Plastics, Ltd., in standard sizes 24 ins. by 24 ins., and 20 ins. by 23 ins., ranging in thickness from 1 to 4 ins. The object of the corrugations is to trap the air and to conduct and drain off any moisture condensed due to changes in humidity. The pads are fitted tightly in position and are sometimes bonded with synthetic adhesives.

(To be continued.)

World's Industry Employs Plastics

GENERAL ENGINEERING

Recommendations for the plastic forming of hard p.v.c.—The working committee for welding and forming of plastics of Kammer der Technik has published an interesting, well-illustrated data sheet. ("Kunststoffe," 1950/Oct./323.)

Nylon as engineering material.—A summary of recent publications has been given by J. A. Buck, dealing in particular with moulding powders and the self-lubricating properties of this material. ("Mechanical World," 1951/Mar. 25/276.)

Reinforced plastics.—A general survey is given on types of resins, fabrication and applications supported by material from well-known firms specializing in these products. ("Product Engineering," 1951/Feb./86.)

Wire guides of nylon have outlasted steel guide pulleys in the ratio 5 : 1. ("Production Engineering and Management," 1951/Jan./154.)

Mounting metallurgical specimens in modified acrylic resin denture materials has been found useful at the Nat. Bureau of Standards, Washington. ("Machinery," (London), 1951/Jan. 18/113.)

Injection moulding machine by Hydraulic Press Mfg. Co., Mount Gilead, Ohio, is made in two parts: mould clamping unit and injection unit are on a separate base. The new machine is claimed to have twice the injection speed of conventional 60-oz. machines and 50 per cent. more plasticizing capacity. ("Automotive Industries," 1951/Feb. 1/58.)

Fabrication.—The Technische Hochschule, Aachen, held a colloquium on the fabrication of plastics, introduced by K. Krekeler with a paper, "The Introduction of Plastics Fabrication in the Workshop." Other speakers were R. Nitsche, "Classification and Standardization of Plastics"; W. Klein, "Development of Thermoplastics in Germany and Other Countries"; H. J. Saechtling, "Technical Properties of Plastics and Their Influence on Applications"; H. Staeger, "Preheating of Moulding Materials, Glueing of Thermoplastics with High Frequency"; H. Zickel, "Machining of Plastics"; O. Dammer, "Welding Thermoplastics for the Chemical Industry"; P. Pintens, "Plastics in Engineering"; K. Pohl, "Plastics, in particular p.v.c. in the Food Industry" and I. Hessen, "Plastics in the Textile Industry and in Arts." ("Industrie-Anzeiger," 1950/Dec. 1/7.)

Dies for motorcar bodies.—R. L. Logne describes the development of the plastic dies for forming sheet-metal parts. ("Automotive Industries," 1950/Dec. 1/53.)

Thermoplastic extrusion now has more applications, in particular for parts in the chemical industry, according to E. G. Fischer. The difficulties of the process are stressed. Accurate extrusion on single-screw extruders is said to be a difficult and uncertain task. ("Chemical Age," 1951/Jan. 13/89.)

Welding methods.—L. M. Jaroff describes several methods for the economic welding of sheets and sections, in particular tubes. ("Materials and Methods," 1951/Feb./74.)

A mill for cutting thermoplastic waste is described by F. Schaupp in a communication of Kunststoff-Rohstoff Laboratorium of Badische Anilin-und Soda Fabrik. The cutter has three interchangeable knives, and the housing also has four interchangeable knives in its upper half. Owing to the different number of fixed and rotating knives vibrations are suppressed. ("Kunststoffe," 1951/Feb./61.)

New fabrication methods for plastics are discussed by K. Stoeckhert, based on a lecture before the Kunststofftagung Munich, 1950. ("Kunststoffe," 1951/Feb./48-52.)

Plating plastics.—J. F. Stirling gives a survey on the basic techniques applied in plating plastics. ("Practical Engineering," 1951/March/224.)

A "drop ball" impact test different from the standard Izod test has been applied to the new rubber-phenolic plastics of the Chemical Division, General Electric Co. The shock resistance of these materials is five to 10 times as great as equivalent phenolic-moulded products. In the test, height and weight of ball are carefully selected; repeated shock is applied to the surface at a range of values up to the actual breaking point. ("Machinery" (N.Y.), 1951/Jan./190.)

Testing plastics.—The various equipment used in the Dutch Plastic Institute is described. Use is made of the testing methods development in America and Germany. ("T.N.O. Nieuws," 1951/Jan./4.)

Strength-variance of plastics. — A statistical study of the effect of pertinent variables when gathering mechanical data from a representative system of plastics such as polymethyl methacrylate has been made by W. J. Gailus and coll. ("Mechanical Engineering," 1950/586.)

ELECTRICAL

The Electrochemical Society Inc. held its 99th meeting from April 8-12 in Washington, D.C. Among the large number of papers presented were the following showing the wide applications of plastic materials in this industry:—

Dielectric fatigue of thermosetting laminates.—These laminates are highly desirable insulating materials as is shown by their wide acceptance in the electrical industry. Although much data have been published on the dielectric strength of high-pressure laminates, very little information is available on their fatigue properties. When breakdown voltage is plotted against time for breakdown to occur, a limiting voltage is found, below which dielectric failure will not occur for an indefinite period of time. Tests of this type yield results which are helpful in the design of insulating components.

Laminates in electrochemical industries.—The production and application of laminated plastics are described by J. C. Pitzer with special reference to the problems of the chemical and electrochemical industries. The resistance of the materials to chemical corrosion and the low dielectric losses of the products are enumerated. Qualities such as good dielectric strength, low loss factor, and good insulation resistance combined with inherent characteristics of heat resistance, high strength-weight ratio and low water absorption indicate a variety of applications.

Dielectric loss in polyethylene insulation and breakdown of air at radio frequencies.—Breakdown tests of air between co-axial cylindrical electrodes at 2-18 megacycles and the thermal method of measuring dielectric loss in polyethylene insulation are described by Donald L. Birx.

Effect of moisture and fungus upon electrical insulating materials. — An evaluation of the effect of fungi on some of the newer plastics, by John M. Leonard, shows that in certain cases the problem has lost the seriousness it once had. The results of intense research on fungicides has also lessened the danger to electronic equipment of fungus attack.

Dielectric heating of plastics.—The principle of dielectric heating, its characteristics and several industrial uses, and the probable future trends in industry are elucidated by M. P. Vore. Among the materials studied are plastics, rubber and textiles.

Polyvinyl chloride as wire and cable insulator.—In many countries, with the exception of the U.S.A., the application of these materials is hindered by the insulation resistance requirements of official testing specifications, originally based on rubber. It is suggested that these specifications should be revised, as the insulation properties of polyvinyl chloride are high enough for almost all practical purposes. ("Philips Technical Review," 1950/Oct./97.)

Communication wire for high-speed laying consists of two conductors individually insulated and jacketed. A thin covering of nylon is applied over the twisted conductors embedding and waterproofing the strands. These wires are in use in Korea and can be laid from aeroplanes at speeds up to 120 m.p.h. ("Electronics," 1950/Dec./134.)

MISCELLANEOUS

Research on dental materials.—A general account of research and development work in the field of dental materials carried out by the National Bureau of Standards contains interesting information on synthetic resins, particularly acrylic resins. (N.B.S. Circular 497/Aug.15/1950.)

Hard plastic spectacle lenses have been in production since 1947 and by means of a surface hardening process it is claimed that the abrasion resistance is 40 times that of early plastic lenses. ("Manufacturing Optician," 1951/Mar./375.)

Spectacle frames.—The relative merits of cellulose acetate and cellulose nitrate from the Australian point of view are discussed by J. H. Prince. He believes that cellulose nitrate is essential for the Australian market. ("Manufacturing Optician," 1951/Mar./371.)

Moulded boat hulls were produced of fibreglass and resin over concrete moulds by North East Coast Yacht Building and Engineering Co., Ltd., Blyth (Northumberland). The first hull was 16 ft. long, but it is intended to build ships up to 100 ft. long. ("Machinery" (London), 1950/673.)

Plastic-coated floor carpeting is recommended for the interior of motor-cars instead of scarce materials such as rubber. The plastic-coated jute felt produced by Burlington Mills, Inc., Burlington, Wis., is said to contain more fibres by weight than the usual undermat felt in cars. ("Automotive Industries," 1951/Feb. 1/72.)

Nylon in the surgery.—A. Roux surveys the applications of nylon in the surgery as a substitute for catgut. ("Produits Pharmaceut" (Paris), 1951/No. 1/25.)

Polyethylene Bottles, practically unbreakable, supply the cooking departments of food plants with a controlled amount of flavours and colours. The contents are identified by differently coloured caps. ("Food Industries," 1950/Dec./118.)

Plastic impregnation for rocks.—To reduce weathering of natural rock material the Materialprüfamt Dahlem, Germany, made tests on 12 types of stone material. Favourable results were obtained with reference to water adsorption and frost resistance. ("Naturstein," (Ulm), 1950/289.)

New synthetic fibre.—Dynel, a form of Vinyon N, is made from 40 per cent. acrylonitrile and 60 per cent. vinyl chloride, polymerized from a mixture of monomers. Its properties are similar to wool; it is non-inflammable. Orders are already ahead of current annual output. ("Chem. Engineering," 1951/Jan./186.)

Compression-moulded reinforced plastics have been reviewed by T. C. Du Mond. An outstanding example referred to is the magazine cover of the Ryan aerial camera. ("Materials and Methods," 1951/Feb./60.)

Electrostatic separation of diamonds.—A. A. Linary-Linholm describes new processes whereby "Bakelite" tubing provided with a shellac/graphite mixture is used successfully as electrodes. ("Mining Journal," 1950/476.)

Identification of natural and synthetic rubbers has now been made possible by their respective X-ray diffraction patterns. Different patterns have been obtained for stretched and unstretched material, as well as aged ones. ("A.S.T.M. Bulletin," 1951/Jan./71.)

Silicones.—A general survey of their origin, properties and applications by C. W. Tod deals in particular with silicone combinations with glass. ("Journ. Soc. Glass Techn.," 1950/58.)

Silicon rubber compounds developed by Chemical Dept., General Electric Co., Pittsfield, Mass., permits rubber fabricators to mould silicone rubber parts easier and with improved mechanical and thermal properties. After warming for 5 minutes, the material has excellent moulding and extrusion properties. ("Materials and Methods," 1950/Dec./87.)

Standards committee of the German plastics industry, 1949.—A general report has been rendered by R. Roehm and G. Ehlers. It informs about the state of standardization, in particular about work which has not yet led to draft standards. ("Kunststoffe," 1950/July/209.)

Polyvinyl resins in Russia.—B. E. Gellers gives a survey of the polyvinyl chloride resins at present in use in Russia. ("Legk. Promysl" (Moscow), 1950/No. 12/36.)

Applications.—R. Hlawka deals with general rules and data on the use of plastics for specific purposes in Austrian industry. ("Oesterreichischer Maschinenmarkt und Elektrowirtschaft," 1950/Dec. 15/494.)

Plastics in Austria.—A special issue, devoted to the plastics industry in Austria, deals with developments in that country, plastics in engineering, chemical and electrical apparatus. ("Oesterreichischer Maschinenmarkt and Elektrowirtschaft," 1950/Nov./445-470.)

Cellulosic Plastics—A statement by Hercules Powder Co. indicates that cellulosic material both in flake and moulding powder forms are available in the U.S. in limited amounts only. Reasons for shortage are given. ("Product Engineering," 1951/Feb./153.)

New methods for embossing thermoplastics are described by K. Stoeckhert, referring in particular to a new embossing calender of Dornbusch and Co., Krefeld, which can give surfaces with coloured surface pattern. The issue contains a foil which has been produced on this machine. ("Kunststoffe," 1950/Nov./357.)

Cementing "Plexiglas."—H. Penkert reports on possibilities of adhesives for "Plexiglas" which have proved suitable in practice. ("Kunststoffe," 1950/Nov./341.)

CHEMICAL

Acrylic plating cylinder.—The barrel plating cylinders of "Plexiglas" made by Hanson-Van Winkle-Manning Co., U.S.A., are suitable for use with cyanide or acid solution at temperatures up to 185 degrees F. For acid baths cast-iron gear-wheels are replaced by "Merlon" (polystyrene) or "Plexiglas." ("Chem. and Eng. News," 1951/Mar. 19/1149.)

Teflon-impregnated packing is made from blue asbestos yarn. It is highly resistant. ("Chemical Engineering," 1950/Nov./176.)

Plastics in chemical plants.—J. A. Buck gives a survey on newer and older materials in chemical plants. Their field being described as: for structural units such as acid tanks, mixing vessels, etc., and installations for special chemical processes; for corrosion-resistant ducting and pipework; for water softening gaskets, joints and internal linings for chemical equipment. ("Mechanical World," 1951/245.)

Internal pipe-coating.—J. K. Alfred reports on coatings of plastics and cement for oil pipes. Coating may be carried out in the workshop or in the field. Advantages and disadvantages are discussed. ("Oil and Gas Journal," 1950/266.)

British Industries Fair

London: Earls Court and Olympia
Birmingham: Castle Bromwich

April 30th to May 11th inclusive

THIS year's British Industries Fair is the fifth Fair of the post-war period, and the 29th occasion of holding the Fair. The Plastics Section is again at Earls Court (first floor). London. Plastics machinery, and additional applications of mouldings, laminates and extrusions, mainly in engineering and building, are exhibited at Castle Bromwich, Birmingham. The very wide range of goods shown at Olympia, London, also includes applications of plastics which are referred to on the following pages.

Following the precedent created last year, a number ot member-firms of the British Plastics Federation are again exhibiting as a combined group on one stand. They are BX Plastics, Ltd.; Bakelite, Ltd.; British Geon, Ltd.; British Industrial Plastics, Ltd.; British Moulded Plastics, Ltd.; British Resin Products, Ltd.; British Xylonite Co., Ltd. (Cascelloid Division); J. Burns and Co.; E. K. Cole, Ltd. (Plastics Division); Crystalate, Ltd.; Thomas De La Rue and Co., Ltd. (Plastics Division); Duraplex (Plastics), Ltd.; Ebonestos Industries, Ltd.; Erinoid, Ltd.; Greenwich Leathercloth Co., Ltd.; Halex, Ltd. (Industrial Division); Imperial Chemical Industries, Ltd. (Plastics Division); Kent Mouldings; Kenverne, Ltd.; London Moulders (Plastics), Ltd.; Mica Products, Ltd.; Tenaplas, Ltd.; Universal Metal Products, Ltd.

Newcomers to the Plastics Section of the Fair include Grist (Plastics), Ltd.; Flexigrip Co., Ltd.; Plastic Engineers, Ltd.; Runcolite, Ltd.; and Arnold Wills and Co., Ltd. A new name among the exhibitors of plastics at Castle Bromwich is V. and E. Plastics, Ltd.

All sections of the Fair are open from 9.30 a.m. to 6 p.m. daily, Monday, April 30, to Friday, May 11, inclusive (Sunday excepted); the Castle Bromwich Section, however, closes at 4 p.m. on May 11.

Exhibits at Earls Court, London

British Plastics Federation (Stands Nos. X13 and X17)

Twenty-three member firms of the British Plastics Federation have a combined exhibit in the Plastics Section. This joint display covers raw materials, semi-finished and finished products, and emphasizes the resources of the Federation members in meeting the requirements of the plastics and plastics-using industries.

BX Plastics, Ltd., have an exhibit consisting exclusively of Saran monofilaments (of which they are sole British manufacturers), combined with "Tygan," the fabric woven from this yarn by Fothergill and Harvey, Ltd.

Bakelite, Ltd., show moulding materials, industrial and decorative laminated sheet, and vinyl compounds and sheet.

British Geon, Ltd., are manufacturers of polyvinyl resins, latices, compounds and pastes. Their exhibit includes Geon 101 electrical grade p.v.c. and the Geon 200 series of copolymers. (This company also has an exhibit at Olympia.)

British Industrial Plastics, Ltd., are well-known as manufacturers of "Beetle" moulding powders, and show typical examples of mouldings made from their products.

British Moulded Plastics, Ltd., have a complete organization for the design and making of mouldings in all proved grades of thermosetting and thermoplastic materials.

British Resin Products, Ltd., are manufacturers of "Cellomold" (cellulose acetate), "Distrene" (polystyrene), and "Rockite" (phenolic and urea) moulding materials. They also supply "Epok" synthetic resins for laminating, impregnating, and surface coating.

British Xylonite Co., Ltd., Cascelloid Division, specialize in transparent cellulose acetate boxes made by Trans-Bo-Matic machinery, "Plax"-type flexible bottles, polythene lay-flat bags, and injection moulded articles for various trades. (This company also has a stand at Olympia, exhibiting their plastics toys.)

E. K. Cole, Ltd., Plastics Division, are showing a variety of plastic mouldings for many industries.

Crystalate, Ltd., draw attention to their complete organization for the design, tooling, moulding, finishing, assembling and packaging of goods in all moulding materials.

Thomas De La Rue and Co., Ltd., Plastics Division, feature "Formica," "Traffolyte" and "Delaron"; also examples of end uses.

Duraplex (Plastics), Ltd., manufacture p.v.c. sheeting and extrusions, of which representative examples are shown.

Ebonestos Industries, Ltd., make a wide range of mouldings for the electrical, scientific instruments, telephone, engineering, motorcar, and aircraft industries.

Erinoid, Ltd., show casein in sheets, rods, tubes and blanks; cellulose acetate in powder form, and as optical sheet and extrusions; polystyrene powders, as manufactured by Styrene Products, Ltd., Manchester, on behalf of Erinoid, Ltd., and p.v.c. sheets and extrusions.

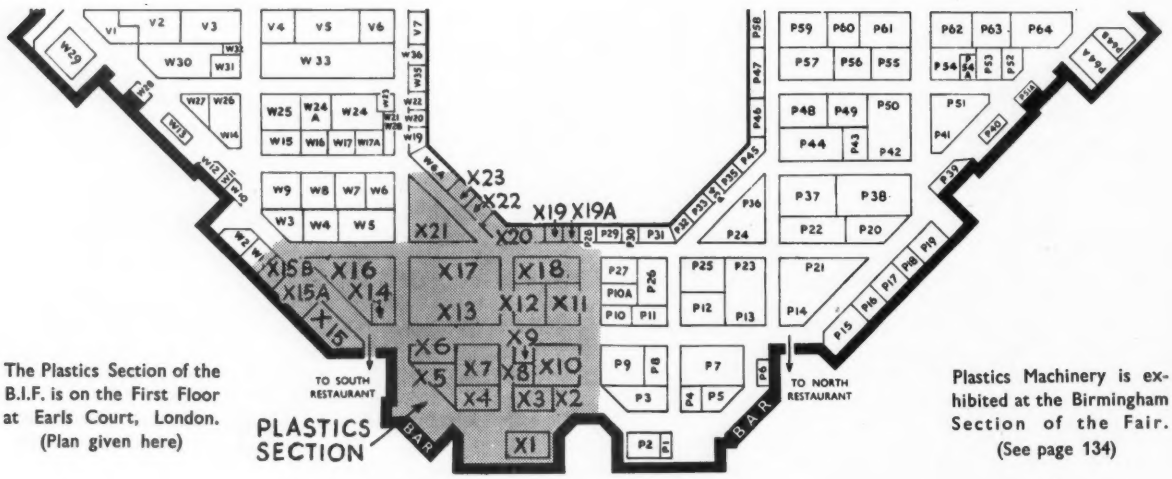
Greenwich Leathercloth Co. Ltd. show "Craylene" and "Craymac" fine plastic sheeting, in both plain and printed form; "Duranide" p.v.c. leathercloth for the motor, aircraft, furnishing, and handbag industries; "Durex" nitro-cellulose leathercloth; and a comparatively new product known as "Craytube." The latter is a p.v.c. extruded hose ($\frac{1}{2}$ to $1\frac{1}{4}$-in. bore) in a pleasant garden-green colour, which is manufactured especially for the horticultural and agricultural trades. The hose is non-kink, flexible, rot-proof, weather resisting, and has very high resistance to abrasion.

Halex, Ltd., Industrial Division, are moulders and fabricators in all thermosetting and thermoplastic materials. (Halex, Ltd., also have a stand at Olympia, where they are showing nursery and household articles in plastics.)

Imperial Chemical Industries, Ltd., Plastics Division, have a composite exhibit covering the range of materials which they manufacture for the plastics industry. "Perspex" acrylic sheet, "Diakon" acrylic moulding powder, polythene ("Alkathene"), "Mouldrite" thermosetting resins, "Nuron" contact pressure laminating resins, and nylon.

Kent Mouldings have a display of bobbins for the textile trade, toys, telephone parts, valve bases, radio knobs, radio cabinets, hearing aid cases and parts.

Kenverne, Ltd., are showing plastic sheeting in plain colours and printed designs. These include roller prints and screen prints, for tablecloths, curtains, or the manufacture of rainwear. They are sole concessionaires for plastic sheeting and tablecloths depicting the J. Arthur Rank "Animaland" characters.



The Plastics Section of the B.I.F. is on the First Floor at Earls Court, London. (Plan given here)

Plastics Machinery is exhibited at the Birmingham Section of the Fair. (See page 134)

Summary of Plastic Exhibits at Earls Court (London)

Exhibitor	Stand No.	Raw materials for moulding: Casein	Phenolics	Urea and/or Melamine	Cellulose plastics	Vinyl (including polystyrene)	Polythene	Acrylics	Casting resins	Finished or semi-finished: Mouldings	Extrusions	Laminates	P.V.C. sheet	P.V.C. leathercloth	Film	Fabrication in acrylic or acetate sheet
Arlington Plastics Development Ltd.	X.4	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—
B.X. Plastics Ltd.	★	×	—	—	×	×	—	—	—	—	×	—	×	—	×	—
Bakelite Ltd.	★	—	×	×	—	×	—	—	—	—	×	×	—	—	—	—
British Ebonite Co. Ltd.	X.14	—	—	—	—	—	—	—	—	×	×	—	—	—	—	—
British Industrial Plastics Ltd.	★	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—
British Geon Ltd.	★	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
British Moulded Plastics Ltd.	★	—	—	—	—	—	—	—	—	×	—	—	×	—	—	—
British Plastics Federation	X.13, X.17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
British Resin Products Ltd.	★	—	×	×	×	—	—	—	—	—	×	—	—	—	—	—
British Xylonite Co., Ltd., Cascelloid Division	★	—	—	—	—	—	—	—	—	×	×	—	—	—	—	×
Burns, J., Ltd.	★	—	—	—	—	—	—	—	—	×	—	×	—	—	—	—
Cole, E. K., Plastics Division	★	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
Crystalate Ltd.	★	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
De La Rue, Thomas, and Co., Ltd., Plastics Division	★	—	—	—	—	—	—	—	—	—	×	×	—	—	—	—
Dermide Ltd.	P.64b	—	—	—	—	—	—	—	—	—	×	—	—	×	—	—
Duraplex (Plastics) Ltd.	★	—	—	—	—	—	—	—	—	—	—	—	×	×	—	—
Ebonestos Industries Ltd.	★	—	—	—	—	—	—	—	—	×	—	×	—	—	—	×
Erinoid Ltd.	★	×	—	—	×	×	—	—	—	—	×	—	×	—	—	—
Flexigrip Co. Ltd.	X.5	—	—	—	—	—	—	—	—	—	×	—	—	—	—	—
Greenwich Leathercloth Co. Ltd.	★	—	—	—	—	—	—	—	—	—	×	—	×	×	—	—
Grist (Plastics) Ltd.	X.2	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—
Halex Ltd., Industrial Division.	★	—	—	—	—	—	—	—	—	×	—	—	—	—	—	×
I.C.I. Ltd., Leathercloth Division	P.64	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—
I.C.I. Ltd., Plastics Division	★	—	×	×	—	×	×	×	×	—	×	—	×	×	×	—
Injection Moulders Ltd.	X.10	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
Kent Mouldings	★	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
Kenverne Ltd.	★	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—
Kleemann, O. and M., Ltd.	X.3	—	—	—	×	×	—	—	—	×	—	—	—	—	—	—
London Moulders (Plastics) Ltd.	★	—	—	—	—	—	—	—	—	×	—	—	×	—	—	—
Marshall, C. and C., Ltd.	X.12	—	—	—	—	—	—	—	—	—	×	—	—	—	—	—
Mica Products Ltd.	★	—	—	—	—	—	—	—	—	×	—	×	—	—	—	×
Moulded Components (Jablo) Ltd.	X.8	—	—	—	—	—	—	—	—	—	—	×	—	—	—	—
Optoplast Manufacturing Co. Ltd.	X.23	Equipment for making spectacle frames														
Phœnix Rubber Co. Ltd.	X.15b	—	—	—	—	—	—	—	—	—	×	—	×	—	×	—
Plastic Engineers Ltd.	X.19	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
Plasticraft Ltd.	X.15	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
Runcolite Ltd.	★	—	—	—	—	—	—	—	—	×	—	—	—	—	—	×
Smith, Stanley, and Co.	X.15a	—	—	—	—	—	—	—	—	—	×	—	×	—	—	—
Stone and Simmons	X.6	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
Storey Bros. and Co., Ltd.	X.16	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—
Tenaplas Ltd.	★	—	—	—	—	—	—	—	—	—	×	—	—	—	—	—
Thermo-Plastics Ltd.	X.11	—	—	—	—	—	—	—	—	×	—	×	—	—	—	×
Universal Metal Products Ltd.	★	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
Vinatex Ltd.	X.20	—	—	—	—	×	—	—	—	—	—	—	×	×	—	—
Vinyl Products Ltd.	X.18	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
Wallington, Weston and Co., Ltd.	X.21	—	—	—	—	—	—	—	—	—	×	—	×	×	—	—

★ British Plastics Federation Stand, X.13 and X.17.

Mouldings, Extrusions and End-uses of Plastics at Earls Court (London)

This tabulated analysis does not necessarily imply that actual examples are exhibited on the stands mentioned, but that these end-uses are indicated generally in the case of some of the exhibitors.

Exhibitor	Stand No.	Electrical industry	Radio and television	Engineering components and tools	Textile machinery	Motorcar parts	Aircraft/shipbuilding	Structural material, including tiles and flooring	Sanitary fittings, refrigerator parts	Builders' hardware	Furniture	Soft furnishings/upholstery	Domestic ware	Travel goods	Sports goods	Toys	Hard haberdashery/fancy goods	Packaging	Clothing, gloves and footwear	Display signs and fittings
Arlington Plastics Development Ltd.	X.4	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	X	—	X	—
Aston and Co.	P.10a	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—
Attewell, B., and Sons, Ltd.	R.13,R.16	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
BX Plastics, Ltd.	★	X	X	—	—	—	—	X	—	—	—	X	—	X	—	—	—	X	—	—
Bakelite, Ltd.	★	X	X	X	X	X	X	X	—	X	X	—	X	—	—	X	X	—	—	—
British Ebonite Co., Ltd.	X.14	X	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
British Geon, Ltd.	★	X	—	X	—	X	X	—	X	—	X	X	X	X	—	X	X	—	X	—
British Moulded Plastics, Ltd.	★	X	X	X	—	X	—	—	—	X	X	—	X	—	—	X	X	X	—	—
British Resin Products, Ltd.	★	X	X	X	X	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
Burns, J., and Co.	★	—	—	X	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cole, E. K., Ltd., Plastics Division	★	X	X	X	—	—	—	—	X	—	X	—	—	—	—	—	—	—	—	—
Crystalate, Ltd.	★	X	X	X	—	X	X	—	—	—	—	—	X	—	—	X	X	X	—	—
De La Rue, Thomas, and Co., Ltd., Plastics Division	★	X	X	X	X	X	X	X	—	X	X	—	X	—	—	—	—	—	—	—
Dermide, Ltd.	P.64b	—	X	—	—	—	—	—	—	—	X	X	—	X	—	—	X	—	X	—
Duraplex (Plastics), Ltd.	★	—	—	—	—	—	—	—	—	—	—	X	—	X	—	X	X	—	—	—
Ebonestos Industries, Ltd.	★	X	X	X	—	X	X	—	—	—	—	—	X	—	—	X	X	—	—	—
Erinoid, Ltd.	★	—	—	—	—	X	—	—	—	X	—	X	—	—	—	X	X	—	—	—
Flexigrip Co. Ltd.	X.5	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—
Goodearl Bros., Ltd.	R.2	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—
Greenwich Leathercloth Co. Ltd.	★	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—	—	—	—
Halex, Ltd., Industrial Division	★	X	X	X	—	—	X	—	—	—	—	—	X	—	X	—	X	—	—	—
Harris and Sheldon, Ltd.	O.713	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
Hislop, J. W. S., Ltd.	O.628	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
I.C.I., Ltd., Plastics Division	★	X	X	X	—	X	X	—	X	X	—	X	X	X	—	X	X	X	—	—
Injection Moulders, Ltd.	X.10	X	—	—	—	X	—	—	—	—	—	—	X	—	—	X	X	—	—	X
Kent Mouldings	★	X	X	X	X	—	X	—	—	—	—	—	X	—	—	X	—	—	—	—
Kenverne, Ltd.	★	—	—	—	—	—	—	—	—	—	—	X	X	—	—	X	—	—	—	—
Marshall, C. and C., Ltd.	X.12	—	X	—	—	X	—	—	—	—	—	X	—	X	X	X	X	—	—	—
Mica Products, Ltd.	★	X	X	X	—	X	X	—	—	—	—	—	X	—	—	X	X	—	—	—
Moulded Components (Jablo) Ltd.	X.8	X	—	X	X	—	X	X	—	X	X	X	—	—	—	—	—	X	—	—
North, James, and Sons, Ltd.	P.71	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
Pell, P., and Sons, Ltd.	P.41, P51	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Perry, John, and Co. (Plastics), Ltd.	V.31	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Phœnix Rubber Co., Ltd.	X.15b	—	—	—	—	X	X	X	—	X	—	X	X	—	—	—	—	—	—	—
Plasticraft, Ltd.	X.15	—	—	—	—	—	—	—	—	—	—	—	X	—	—	X	X	—	—	—
Risboro' Furniture, Ltd.	R.2	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—
Smith, Stanley, and Co.	X.15a	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—	—	—	—
Stone and Simmons	X.6	—	—	—	—	—	—	X	—	—	—	—	X	—	—	—	X	—	—	—
Thermo-Plastics, Ltd.	X.11	X	X	X	—	—	X	—	X	X	—	—	X	—	—	—	—	—	—	X
Vinatex Ltd.	X.20	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—	—	—	—
Wallington, Weston and Co., Ltd.	X.21	X	—	—	—	X	—	X	—	—	—	X	—	—	X	—	—	—	—	—
Wills, Arnold, and Co. Ltd.	X.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—

★ British Plastics Federation Stand, X.13 and X.17.

London Moulders (Plastics), Ltd., produce both injection and compression mouldings, including table and nursery ware; they also show plain and printed p.v.c. sheeting.

Mica Products, Ltd., are well known for laminated plastics and micanite tubes, bobbins, and formers, and for insulation components.

Tenaplas, Ltd., display a selection of extruded polythene tubing of all sizes up to 9-in. diameter by ⅜-in. wall thickness; valves, tee-pieces, bends, etc., and buckets fabricated in polythene; and a selection of extruded p.v.c. sections.

Universal Metal Products, Ltd., exhibit representative examples of the moulded goods which they have been making for many and varied uses.

Arlington Plastics Development, Ltd. (X.4)

"Arlinghide" leathercloth for the upholstery, travel goods, handbag and footwear trades, including imitation reptiles—crocodile, python, cobra and ring lizard—are shown by this company. Also featured are imitation fabrics—tartan and checks—and plain and embossed enrober belting.

British Ebonite Co., Ltd. (X.14)

A display of ebonite sheet, rod and tube from small diameters to large diameters, pump rings for use in hot-water pumps, mouldings, turned parts, ebonite bath wastes, including ebonite tubes up to 10 feet long, can be seen at this stand.

Dermide, Ltd. (P.64b)

This company makes p.v.c. leathercloth for the furniture, handbag, travel goods, shoe and motorcar industries. They are showing a jerkin or windjammer made from unsupported p.v.c. material of their manufacture. Garments of this type have usually been made from leather, but p.v.c., due to its softness and suppleness, is easier to machine and also has a greater amount of comfort for the wearer. They are also showing a handbag in pig-skin effect, which is the result of several months' endeavours to produce material with this finish.

Flexigrip Co., Ltd. (X.5)

The "Flexigrip" plastic slide fastener to be seen here is an entirely new product protected by world patents and registered designs. The fastener is produced in rolls of 200 ft., which results in enormous economy to the manufacturer, in so far as he is not required to hold in stock large quantities of fasteners of specific lengths. All that is required is to cut from the roll the necessary length for any product, and to fix the slider by a simple method. The fastener is flexible, and the closure is airtight and waterproof. These last two features create a wider field of uses than is available for other fasteners. Another interesting point is the fact that this fastener can be heat welded into a plastic article as well as the more usual method of sowing. Finally, the small amount of metal which is required for the production of this fastener is a considerable asset in these days of metal shortage.

A number of trades have already incor-

porated the "Flexigrip" fastener into their productions. Among these are the bag trade, manufacturers of moth-proof and dust-proof bags, and hospital and surgical supply manufacturers. Naturally, the fact that this is a plastic fastener does to a certain extent limit its uses. For instance, the makers do not generally recommend that it should be incorporated in clothing or for outside fasteners of heavy luggage, but leading companies are at present experimenting to produce the same fastener in a stronger and more flexible form.

M. H. Grist (Plastics), Ltd. (X.2)

The exhibit by this company is devoted entirely to reprocessed cellulose acetate moulding powders. They are now able to produce this material in bright colours, and have not only moulding powders on show but also a number of mouldings from customers—at home and overseas.

Imperial Chemical Industries, Ltd., Leathercloth Division (P.64)

The "Vynide" range of polyvinyl chloride-coated leathercloth and "Rexine" nitrocellulose-coated leathercloth are to be seen in the leather goods section. Applications of these materials include upholstery for furniture and cars, handbags and travel goods, shoes and clothing.

Injection Moulders, Ltd. (X.10)

A very comprehensive range of toys, costume jewellery, novelty goods, advertising items, etc., will be seen at this stand, where there is also an interesting range of speciality custom mouldings covering a variety of industries. One of the exhibits is a portable radio cabinet produced for Kolster-Brandes.

Kleemann, O. and M., Ltd. (X.3)

"Kabroloid" cellulose acetate and "Kleestron" polystyrene moulding powders, manufactured by O. and M. Kleemann, Ltd., are exhibited. As makers of plastics, toys, combs, fancy goods, haberdashery and sun glasses, this company are exhibiting at the Olympia Section of the Fair.

Marshall, C. and C., Ltd. (X.12)

As manufacturers of extrusions for all trades, they are showing specially designed sections for the motorcar, upholstery, leather goods and other industries.

Moulded Components (Jablo), Ltd. (X.8)

The main features of this exhibit are "Jabroc" and "Aero Jablex." "Jabroc" is a highly densified laminated veneers structure, largely used for making press tools, jigs, templates, stretching blocks and drawing tools, etc., and for other industrial purposes. "Aero Jablex" is a lightweight plastic composition produced in grades of varying rigidity and flexible resiliency, which have a number of industrial applications. The rigid grade is a very highly efficient low-temperature insulator, and on account of its light weight is ideal for the insulation of vehicles or for frozen food containers.

Extra-rigid grade "Aero Jablex," besides being an insulator, has sufficient structural properties to permit the construction of containers for the transport of ice cream or frozen foods, without the use of wood, metal or braces. It is exceedingly light in weight and of sufficient strength to withstand abuse. "Aero Jablex" in the soft grade has been approved for use in life jackets; the resilient grades are also used for protecting goods against damage in transit.

Optoplast Manufacturing Co., Ltd. (X.23)

This company is demonstrating its "Pimo" equipment for manufacturing reinforced spectacle sides in any thermoplastic material, such as cellulose acetate or nitrate. Amongst the advantages offered by this method are: (1) Piercing and moulding in one operation; (2) use of any type of thermoplastic material; (3) any style of spectacle side can be produced on one and the same machine; (4) very little floor space is occupied; (5) maintenance is practically nil; (6) unskilled operatives of the machine can be trained within a few hours.

Phœnix Rubber Co., Ltd. (X.15b)

This exhibit comprises "Phenco" plastics flooring in roll form and as tiles, bench and bar coverings, plastics sheeting in all thicknesses, plastics hose, and plastic anti-corrosion compounds.

Smith, Stanley and Co. (X.15a)

"Vitrone" flexible and rigid p.v.c. sheeting and extrusions are exhibited, including embossed and mirror-finish surfaces. Thick p.v.c. for making washers, and rigid p.v.c. sheet for printing plates and for chemical plant, are also shown.

Stone and Simmons (X.6)

Productions in polystyrene shown at this stand include cups and saucers of various designs and sizes, soup dishes, ice cream dishes, beakers (lipped and straight), cheese dishes, egg containers, food covers, baby mugs with two handles, mustard dispensers, and other table ware. A new measure beaker is shown for the first time. For the Far East trade there are chopsticks and chinese tea cups, the latter shown for the first time. Polytiles (plastic wall-tiles) in standard sizes and angle tiles in black, white, ivory, green and blue are also exhibited. The table-ware is made in a number of pastel colours, also crystal-clear (transparent), transparent colour and bone-white.

Storey Bros. and Co., Ltd. (X.16)

The exhibits of this company include p.v.c. sheet in the form of table covers and texturized "Storeen" for curtains and many making-up purposes. The texturizing of the back of their Crown table covers is a new innovation which has certain definite advantages in that it makes the product more fabric-like in appearance and handle, prevents slip on the table, and improves the drape qualities. These Crown table covers are now being exported to more than 55 different markets abroad.

"Storeen" has been on the market for some time, but the texturizing of this material is a new innovation. It has the advantage of greatly improving the draping quality, and also of taking away any tendency to tack.

Thermo-Plastics, Ltd. (X.11)

At this year's B.I.F., Thermo-Plastics, Ltd., are making a special feature of the television escutcheons they are now producing for the radio and television industry, and of the work they are doing in rigid p.v.c. and in "Perspex" for the photographic industry. In the latter connection they are showing a large etching bath produced for Hunter-Penrose, Ltd., from rigid p.v.c., together with developing dishes, etc., produced in "Perspex," and process tanks and developing dishes in cellulose acetate.

Also shown are some very interesting examples of moulded displays manufactured during the past year, and standard lines in catering equipment, including several new designs for food containers.

Vinatex, Ltd. (X.20)

This company displays a complete range of p.v.c. supported and unsupported sheeting, which is seen in a number of new forms. Particular emphasis is given to embossed sheeting in thicknesses of 0.004 in. and over. Attractive designs provide damask effects. A wide range of "Vinatex" printed sheeting is printed in single- and multi-colours. Supported and unsupported sheeting which has been deeply embossed to give attractive and interesting effects of particular interest to handbag manufacturers, and for some specialized uses for upholstery purposes is also exhibited.

Vinatex, Ltd., has also become the sole distributor of the thin polyvinyl chloride sheeting up to 12/1,000 in. thick, made by Dunlop Special Products, Ltd.

Vinyl Products, Ltd. (X.18)

The main portion of this exhibit concerns "Vinamul" and "Vinalak" polyvinyl acetate emulsions and solutions. Finished samples indicate the use of these materials in various industries, with particular emphasis on a new range of emulsions which have been perfected for the paint industry as a base for washable wall paints. The polyvinyl acetate solutions are being used extensively in the paper coating and packaging industry and have introduced a new and rapid technique for the heat sealing of paper packages, thus dispensing with liquid glues, as the solutions are coated on to the paper or card prior to fabrication. A subsidiary display concerns polymethacrylates, which are supplied in emulsion and solution form, at the present time restricted in range to polybutyl methacrylate and polymethyl methacrylate. Samples of higher methacrylates, however, are shown, which can be produced in limited quantities for experimental purposes. These products find use particularly for the finishing of leather, and in the form of solutions as base media for heat-resisting paints.

Another section of this stand provides a display of polyvinyl chloride compounds and pastes for calendering, extrusion, injection moulding and slush moulding. A third section deals with "Vinamold" hot melt compounds.

Wallington Weston and Co., Ltd. (X21)

A complete range of this company's products is exhibited. "Fromoprene" is a unique laminate combination of resin-impregnated paper or fabric sheets bonded in desired thicknesses, with a special rubber facing, the latter compounded to give very high dielectric properties. "Fromocene" satin finish is a 7- to 9-thou. p.v.c. sheeting in special draping quality. "Hibudine" is the company's trade name for extrusions, mouldings and sheets manufactured in high-grade copolymers to withstand extremes of cold and heat, coupled with oil and petrol resistance.

Shown at the B.I.F. for the first time are "Fromosan," a new development in plastic sheeting, which in outward appearances is similar to a thin embossed p.v.c. sheet, but has remarkable qualities in that it is self-sterilizing and bactericidal; "Fromocene" unembossed thin sheeting in fire-resisting quality, a non-toxic quality for food packaging, and a special quality having a very low degree of moisture permeability; "Fromoplas" rigid and semi-rigid plastic compounds made from a vinyl base; and "Fromolin," which is a special type of paper backing coated with a scratch-resisting vinyl compound, and embossed in several colours and designs.

Wills, Arnold, and Co., Ltd. (X.9)

Applications of p.v.c. extrusions are exhibited by this company, who are makers of belts, watch straps, etc.

Exhibits at Olympia, London

Chemicals—Olympia, Ground Floor, Section B

B.B. Chemical Co., Ltd. B.45.—A wide range of "Bostik" industrial adhesives which find many uses in bonding plastics to other materials.

A. Boake, Roberts and Co., Ltd. B.31.—In addition to the range of plasticizers, solvents, resins, etc., which are this company's usual contribution to the plastics industry, they have recently introduced "re-odorants," a range of aromatics which can be added to commercial products normally handicapped by unpleasant odours, in order to give them a clean refreshing smell.

The Distillers Co., Ltd. B.5/16.—Subsidiary companies of the industrial group of D.C.L. have combined to produce one large exhibit. British Geon, Ltd., manufacturers of "Geon" polyvinyl resins, pastes and compounds, and British Resin Products, Ltd., manufacturers of cellulose acetate, polystyrene, phenolic and urea moulding materials and of synthetic resins and adhesives, are also represented in the Plastics Section at Earls Court. British Industrial Solvents, Ltd., manufacturing plasticizers and solvents, completes the group's direct interest in the plastics industry.

Dohm, Ltd. B.39.—Graded and pulverized raw materials include moulding powders and fillers for the plastics industry. Another product of the company is a hot-melt compound specially formulated for making flexible moulds.

Lankro Chemicals, Ltd. B.34.—Among the exhibits are plasticizers, stabilizers and colours for plastic materials.

May and Baker, Ltd. B.25.—"Uvethon" for sunblinds, "Ethulon" tracing films and "Acelon" decorative sheeting are the three cellulosic sheet materials made by this company. A further product is "pearl paste" which may be compounded with various plastics to give them a pearl-like appearance.

Monsanto Chemicals, Ltd. B.4.—Polystyrene moulding crystals manufactured in this country for the first time form the most interesting of the products of this company. "Aroclors" chlorinated diphenyls used as plasticizers/extenders for p.v.c. and other plastics are among other Monsanto chemicals of interest to the plastics industry.

Scott, Bader and Co., Ltd. B.29.—Phenolic, maleic and alkyd resins are shown as well as "Marco" polyester resins for low-pressure laminating and coating. Other products are shown including pigment pastes and copolymer emulsions for the textile industry.

T. W. and T. A. Smith, Ltd. B.26.—Manufacturers of inorganic and organic pigments.

Watford Chemical Co., Ltd. B.33.—Chemical products of this company include resins, moulding powders, plasticizers, drying oils and solvents.

Williams (Hounslow), Ltd. B.27.—Aniline dyestuffs for all purposes, including moulding powders.

Music and Radio—Ground Floor, Section C

Whiteley Electrical Radio Co., Ltd. C.25 and 26.—Some of the most interesting mouldings made by these manufacturers of radio and electronic apparatus are the phenolic housing and base for the Radio Sonde Mark II meteorological transmitter.

Scientific and Optical—Ground Floor, Section D

Educational and Scientific Plastics, Ltd. D.48.—Plastics accessories for medical teaching now include a latex model of the human brain, a demonstration model for midwife training besides a full size replica of the human skeleton. A new production is the miniature skeleton which is only 26 ins. high.

Loma Electronic Equipment, Ltd. D.29.—The "Metaltector" is an instrument which automatically detects metal particles in any non-metallic products.

"Ossicaide" Deaf Aids. D.49.—Plastics are used for the ear-piece as well as for many insulating components on the "Ossicaide" hearing aids.

Pifco, Ltd. D.6.—The vibratory massager, heat massager and hair dryer of this company are all housed in ivory plastics mouldings.

Sangamo Weston, Ltd. D.43.—Plastics are used in practically the entire range of "Weston" electrical instruments and in nearly every instance the instrument, meter or time switch is housed in a moulded "Bakelite" case.

H. J. Thormann Engineering Co., Ltd. D.47.—Number wheels and pinions in polystyrene and acrylics, for the gas, water and electricity meter industries.

The Warm-Glow Co., Ltd. D.10.—The new "Vigilux" electric blanket incorporates an improved variable temperature control. The helical-wound heating elements and the thermostats are covered with a waterproof plastic material.

Chemists Supplies—Ground Floor, Section E

P. B. Cow and Co., Ltd. E.27.—Plain and printed p.v.c. sheeting, baby pants and other made-up articles are shown.

Dalmas, Ltd. E.35a.—The surgical dressings manufactured by this company show some interesting uses of plastics.

Delavelle (G.B.), Ltd. E.33.—Plastics mouldings are frequently employed in the ingenious novelty packs for this company's perfumes and other cosmetics.

Ivers-Lee (Great Britain), Ltd. E.11.—This company's work on heat-sealed unit packages for pharmaceutical and other products was described in "Plastics," 1951, March, p. 64, and April, p. 94.

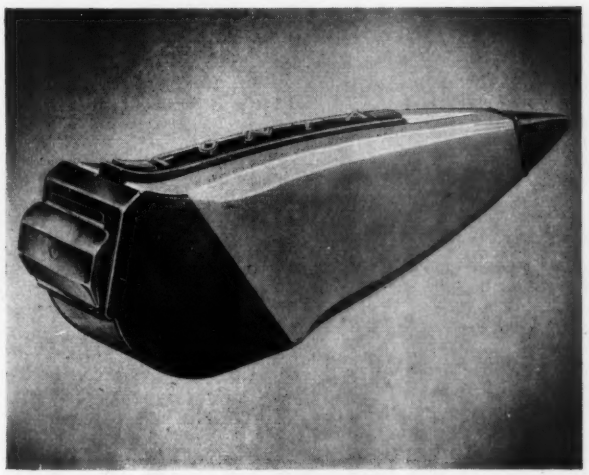
Manesty Machines, Ltd. E.6.—Pelleting and preforming machines with many applications in the plastics industry.

Ramer Chemical Co., Ltd. E.30.—Toilet sponges made of high-grade synthetic resin.

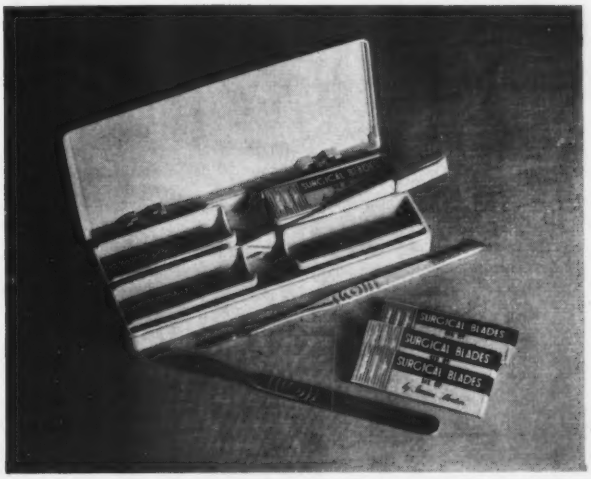
Santos Manufacturing Co., Ltd. E.48. Plastics cups are fitted to the one-pint and two-pint models of the "Vacwonder" vacuum flasks.

William Sessions, Ltd. E.13.—Labels, seals, packages and displays for the cosmetics and toilet industry.

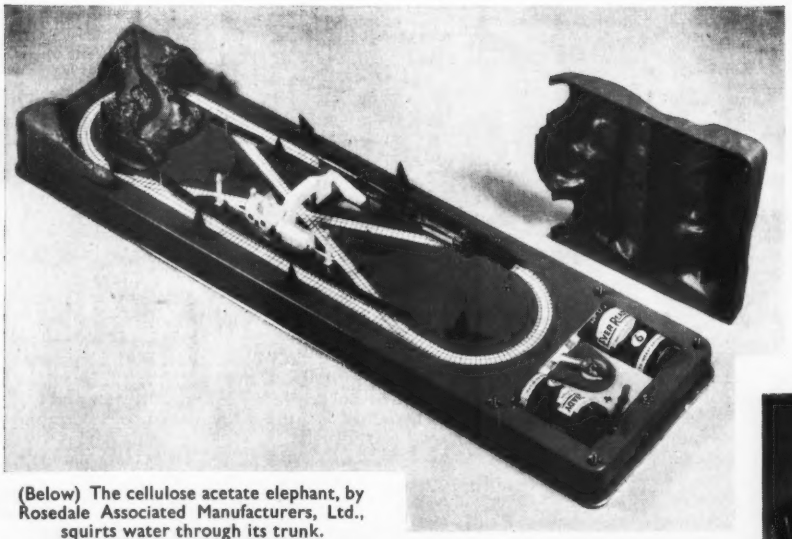
Viscose Developments, Ltd. E.3.—Bottle closures, small containers and industrial components moulded in plastic materials.



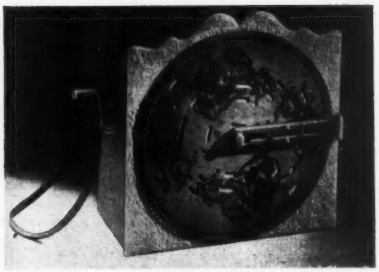
The "Fonta" water razor, made by the Noel-Davies Research Group, Ltd



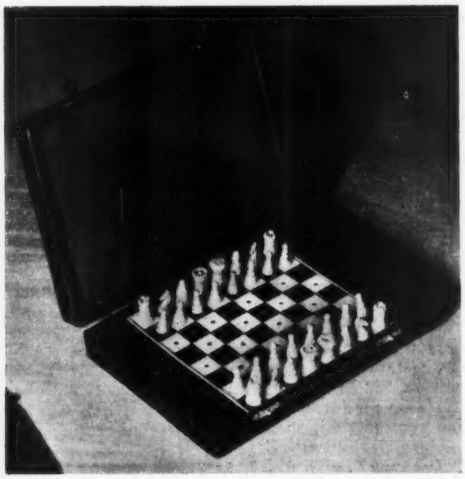
"Swann Morton" surgeon's case, made by W. R. Swann and Co., Ltd.



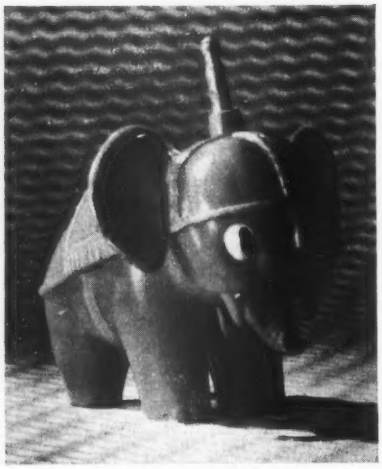
(Below) The cellulose acetate elephant, by Rosedale Associated Manufacturers, Ltd., squirts water through its trunk.



(Above) This hurdy-gurdy musical toy is manufactured in plastics by Selcol Products, Ltd.



(Above) The "St. George" chess set made by E. Lehman and Co., Ltd., has board and pieces in plastic materials.



(Above) The train, station and tunnels of this miniature railway by Lines Bros., Ltd., are of injection-moulded plastics.

(Left) Batley and Co. manufacture maracas from "Bakelite."

Printing Machinery—Ground Floor, Section F

Pictorial Machinery (Chemicals), Ltd. F.14a.—Manufacturers of "Perspex" developing dishes in various sizes for use in photographic and process engraving work.

Office Appliances—Ground Floor, Section G

Markmaster, Ltd. G.1. **Masson, Seeley and Co., Ltd.** G.53 **and Rejafix, Ltd.** G.48.—All show marking and printing machines which may be used to mark or print all types of plastics.

E. Shipton and Co., Ltd. G.55.—Internal office communication systems and the new "Interecorder" magnetic type recorder all make use of plastics components. The latter machine is housed in a shaped "Perspex" casing. Injection mouldings of all types, made by the company, are also on view. The most interesting range of exhibits from the point of view of plastics applications are the polythene bottles and jars moulded for Industrial Appliances, Ltd. The latest of these is an 80-oz. container fitted with a "100 per cent. safety pourer." It is said to be the largest container yet "blown" in England. The tare weight, 1 lb., may be compared to 4 lb. of an equivalent glass container.

Other office appliance manufacturers using plastics in their products are **E.M.I. Sales and Service, Ltd.** G.60, manufacturers of the "Emidicta" dictation machine, **Gestetner, Ltd.** G.10, manufacturers of duplicators, and **Hadley Sound Equipments,** G.40, manufacturers of "Multicom" office intercommunication systems.

Jewellery—Ground Floor, Section H

Several manufacturers of metal ware exhibiting in this section make use of plastics components and accessories in their products.

The Noel-Davies Research Group, Ltd., are introducing the "Fonta Water Razor." This instrument enables shaving to be done without soap, brush, cream or electricity. The beard is softened by the continuous application of hot water stored in water tanks. The body of the razor and the various water tanks are moulded in polystyrene by Ashdowns, Ltd.

Platers and Stampers, Ltd., H.132, make extensive use of phenolic mouldings by Ashdowns, Ltd., for the handles of the "Ekcomatic" and "Prestige" pressure cookers. A new product is a portable surface oven.

W. R. Swann and Co., Ltd. H.224. The "Swann-Morton" surgical knives and knife-holders are fitted into an elegantly designed plastic case in pale blue.

J. E. V. Winterbourne, Ltd. H.214, H.309, H.310, H.412 and H.703. This subsidiary of Smiths English Clocks, Ltd., manufactures clock cases in all materials, including plastics.

Brushware and Brushmaking Machinery—Ground Floor, Section K

J. Evans and Sons (Portsmouth), Ltd. K.18. A large range of brushmaking machines may be used for the manufacture of all types of brushes in materials including several of the plastics group.

Halex, Ltd., K.1, who share a stand with their associate company **Scintillex, Ltd.,** will show a variety of brushes and various other mouldings for household and toilet goods and for industry. Other brush manufacturers using such materials as "Perspex," "Catalin," "Bakelite" and nylon include **H. G. Benwell and Co., Ltd.,** K.3, **Denmen Products, Ltd.,** K.23, who use round-tipped moulded nylon bristles, and **Henderson Bros. and Co., Ltd.,** K14.

Fancy Goods—First Floor, Section L

A.B.C.D. (Plastics), Ltd. L.96A. Manufacturers of lamps, display fittings and other fabrications in plastics.

The Aberdeen Combworks Co., Ltd. L.120. Combs and toilet articles in natural horn, casein, cellulose acetate and other plastic materials. Toys include a doll's tea-set.

Besway Manufacturing Co., Ltd. L.85. Some of the range of trays made by this company incorporate bases of decorative plastic laminates.

Rowland Carvendale, Ltd. L.22. Lamp shades made by this company employ plastics sheeting.

Colibri Lighters, Ltd. A Disc Flint Pack, holding 12 flints, is moulded in transparent plastic material. By turning the disc lid of the container, one flint at a time may be removed.

Combex, Ltd. L.92. Productions include hair slides, combs, brooches, toys and fancy goods moulded in plastics. A number of metal-coated brooches were shown in "Plastics," April 1951/88.

Dorset Light Industries, Ltd. The "D.L.I." series of flintless table lighters employ "Beetle" plastics mouldings in their construction.

Fentocraft, Ltd. L.53. Among the hand-decorated plastics household articles shown are a sauce bottle holder and a jam jar holder, moulded in various pastel shades.

B. Gilder, Ltd. L.10. Extruded plastic strip has replaced enamelled cane for binding the frames of "Durobound" trays, cake stands, etc.

H. J. Gordon and Sons, Ltd., and Thanet Moulders, Ltd. L.103. Decorated plastics household articles and fancy goods, such as cruet sets, egg timers, cheese dishes and fruit bowls are injection-moulded in various colour.

Hillier Engineering Co., Ltd. L.57. Both the car model and the table model of the "Falcon" automatic flintless lighter are housed in "Beetle" urea mouldings.

E. R. Holloway, Ltd. L.13. Besides the large variety of combs previously manufactured, pen holders, artists' brushes, slides and sun glasses are now also produced.

80 oz. polythene container moulded by E. Shipton and Co., Ltd., for Industrial Appliances, Ltd.

Jarret, Rainsford and Laughton, Ltd. L.98, L.99 and L.100. With their associate companies Stratton Compacts and Twinco, Ltd., these manufacturers are showing plastics-framed sun glasses and flexible beakers, mixing bowls and food containers.

Jekmoth Home Store, Ltd. L.94. Plastic sheeting is used in the manufacture of garment covers, hanging wardrobes, blanket bags, shower capes, etc.

William Levene, Ltd. L.61. A number of the household "gadgets" made by this company are moulded in plastics. These include an egg whisk and a juice extractor.

Mendle Brothers, Ltd. L.17. New items which have been added to the range of compression-moulded and injection-moulded tableware, kitchen and bathroom accessories include a shaker, a lemon squeezer, a rack for beakers and tooth brushes, and sets of refrigerator dishes.

Printac, Ltd. L.60. Manufacturers of the "Giftmark" embossing and marking machine which was described in "Plastics," January, 1950.

P. Sedley. L.114. Sole agents for "Handifan" and "Klos Klips" plastics goods.

Arthur Weil, Ltd. Products include spangles, sequins and plastic jewellery.

Stationery Goods—First Floor, Section M

Biro Pens, Ltd. M82. This company makes use of plastics not only in the construction of ball-point pens, but also for special displays.

Bowler Products, Ltd. M92. The body of the "Half-Crown" ball-point pen is injection-moulded in two pieces from cellulose acetate.

Cigarette Components, Ltd. M118. The "Filtrona" plastic cigarette holder incorporates a special filter.

A. W. Ellis, Ltd. M5. Pencil cases in various materials and advertising novelties are manufactured by this company.

Josalex, Ltd. M114. The main products are novelty pencil sharpeners in all types of plastic materials. Other plastic mouldings include a set of nursery tableware.

Mentmore Manufacturing Co., Ltd. M91. The manufacturers of "Mentmore" and "Platignum" pens also have a plastics division engaged in trade injection-moulding.

Penkala Products, Ltd. M24. The "Roll-tip" Inkpencil comprises a moulded hexagonal barrel and plastic cap with pocket clip.

Rees, Pitchford and Co., Ltd. M54. Office appliances and stationers' sundries include desk diaries, note pads, ash trays, etc., moulded in various plastics.

Silk Screen Arts, Ltd. M101. Silk screen printers on plastics, especially p.v.c. sheeting, including banners for the ice cream and similar trades.

The Unique Slide Rule Co. M22. Slide rules are the principal exhibits of this company, but various drawing instruments are also shown.

Waterman Pen Co., Ltd. M73. Among the exhibits on this stand is a new ball-point pen which has a regulated ink control fitted to the transparent plastic refill.

S. Wolffing, Ltd. M84. Plastic products for the stationery trade include propelling pencils and ball-point pens, calendars and advertising novelties. These plastics fabricators also make umbrella handles, brush handles and manicure-set handles.

Toys and Games—Second and Third Floors, Section N

Batley and Co. N38. Novelty maracas for Latin-American bands are manufactured in phenolic materials.

Cascelloid, Ltd. N102. Products include "Palitoy" and "Plastex" dolls, train sets, educational, nursery and novelty toys.

R. A. Clements (London), Ltd. N114. The main range of products shown are dolls' accessories, such as tea-sets. Other plastic toys and novelties include train sets, Christmas bells, Easter eggs and sun glasses.

E.V.B. Plastics, Ltd. N103. Among the "Beeju" injection-moulded toys are a coloured television set, a ferry-boat, building sets, lorries, engines, etc.

Grovewell, Ltd. N8. Besides toys, such as the squirting elephant, miniature shower bath and canoe, the company manufactures a plastic cycle horn and ice-cube containers.

E. Lehman and Co., Ltd. N13. Dominoes, dice, draughts, and other game sets are shown. A travelling chess-set is illustrated on p. 132.

Lines Bros., Ltd., and International Model Aircraft, Ltd. N147/148. Exhibits fall into three classes: "Pedigree" dolls, "Tri-ang" mechanical toys, in which plastics are increasingly replacing metals, and model aircraft airscrews and wheels.

K. J. Mayer. N119. Agent for "Seaforth" toy tea-sets and other toys, and for "Sunny Smile" plastics baby goods, such as rattles, teething rings and nursery tableware.

L. Rees and Co., Ltd. N130. Sole distributors for "Rosebud" plastics dolls manufactured by Nene Plastics, Ltd.

Rosedale Associated Manufacturers, Ltd. N26. Besides a large variety of plastics toys and baby rattles, combs, fancy goods and moulded hardware are also exhibited.

M. Sachs. N28. The attractive Christmas tree decorations shown are hand-made from cellulose acetate sheet interleaved with coloured viscose film.

Selcol Products, Ltd. N6. Musical toys, including the hurdy-gurdy shown on p. 132, are exhibited, as well as various novelty articles moulded in plastics.

D. G. Todd and Co., Ltd., and **J. Cowan (Dolls), Ltd.** N4. Manufacturers and sole distributors, respectively, of dolls and plastics mouthorgans.

Toy Importers, Ltd. The latest addition to the "Timpo" plastics mechanical toys is an alligator with movable legs, head and tail.

Vogue Manufacturing Co., Ltd. N121. Most of the toys, rattles, toilet goods, fancy goods and advertising novelties are fabricated from cellulose acetate sheet.

Woggle Sales, Ltd. N54. A novelty specially designed for the Festival of Britain and approved as a souvenir is the "Model View Finder." The viewer is made entirely of plastics, including the magnifying "window" showing London views.

Wood and Kotek, Ltd. N30. A large range of plastics toys, nursery ware and novelties, including a stereoscope, binoculars, coat hangers, feeding sets, etc.

Other manufacturers exhibiting toys made from plastics are Airfix Products, Ltd., N129; Chad Valley Co., Ltd., N138; Christie and Jay, Ltd., N25; Cecil Coleman, Ltd., N137; Cowan de Groot, Ltd., N20; Dandy Toys, Ltd., N52; G. Goodfellow, N21; Kiddicraft, Ltd., N128; O. and M. Kleemann, Ltd., N135; The Mettoy Co., Ltd., N131; Rovex Plastics, Ltd., N142; Thomas Salter, Ltd., N132; Woodrinoid Products, Ltd., N61.

Plastics at the Birmingham B.I.F.

A notable range of plastics machinery is exhibited at the Birmingham (Castle Bromwich) section of the Fair, where there is also a selection of plastics mouldings, laminates and extrusions which are finding applications in the engineering and electrical industries, and in the building trade. A number of the machines are seen in operation.

Plastics Machinery

B.I.P. Engineering, Ltd. (C.307/208)

At last year's Fair, B.I.P. Engineering, Ltd., introduced for the first time its "Bipel" hydraulic moulding presses with automatic control of the moulding cycle. The press shown on that occasion (Type 100) had a pressure range of 50-150 tons.

At this year's Fair the company will for the first time be showing all three of its moulding presses in the "Bipel" range. These are Type 40 (pressure range 20-40-60 tons), which is continuously in operation making mouldings; Type 100 (pressure range 50-100-150 tons) also fully powered for demonstration purposes; and Type 200 (pressure range 100-200-300 tons), of which only a full-scale model is shown. The Type 40 and Type 100 presses have self-contained power units, but where more than one or two presses are installed, the alternative method of line power from a single small power unit is recommended as being far more economical. Such a unit will drive a battery of presses up to 12 in number, the principle being that the line pressure is kept at 1,000 p.s.i., and can be stepped up by means of the intensifier to 2,000 or 3,000 p.s.i., hence the choice of three tonnages for each type of press.

The most interesting parts of the Type 200 press are also separately exhibited, namely, the electrical control panel and the hydraulic components.

Bradley and Turton, Ltd. (D.237)

This year Bradley and Turton, Ltd., are showing their self-contained 75-ton press embodying several interesting features, and also two of their automatic control units coupled to a downstroking and an upstroking press, respectively.

The No. 924 75/10-ton machine is a downstroking press following the general lines of their standard No. 324 presses, but fitted with a self-contained pump unit and having single lever valve control. The pressure exerted is quickly adjustable between 75 and 10 tons, and a special control device is fitted to slow down the speed of the main ram as the tool closes. Provision is also made on the single lever valve to enable the ejectors to be returned to the loading position without closing the operator guard. The machine, as also a larger 150-ton model, has been developed to meet the present-day demand for high-speed operation.

The automatic control unit, a definite step forward in the control of hydraulic presses, has incorporated several important new features since being introduced last year. Briefly, the unit controls the cycle of operations on the press from the time the operator has put the powder into the mould and closed the guard until the press has opened again and the moulding is ready to be taken out. A safety reversing switch, newly incorporated, enables the operator to stop and reverse the press should an insert become displaced or for any other reason. Time delay switches are also fitted to allow long pauses before or during

Summary of Plastics Machinery at Castle Bromwich, Birmingham.

Exhibitor	Stand No.	Moulding presses (including transfer moulding)	Injection moulding machines	Extrusion machines	Preforming machines	Hobbing presses	Moulds	Die-sinking machines	Steels for moulds	Calenders	H.F. welding and preheating	Pulverizing machinery	Granulating and blending machinery	Timing and temperature controls	Polishing machines	Marking machines
Allen, Edgar, and Co., Ltd.	D534	—	—	—	—	—	—	—	X	—		—	—	—	—	—
Applied High Frequency, Ltd.	D416	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—
B.I.P. Engineering Ltd.	C307/208	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Barlow-Whitney Ltd.	C306	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—
Blending Machine Co. Ltd.	C605	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—
Bradley and Turton Ltd.	D237	X	—	—	—	X	X	—	—	—	—	—	—	—	—	—
British Jeffrey-Diamond Ltd.	D526	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
C and G Gauges, Ltd.	D144	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Carr, Richard, W., and Co. Ltd.	D234	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Christy and Norris Ltd.	D403	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
Cohen, George, Sons and Co. Ltd.	Outdoor stand	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daniels, T. H. and J., Ltd.	D310	X	—	—	X	X	X	—	—	X	—	—	—	X	—	—
E.M.B. Co. Ltd.	D240	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
Elliott Bros. (London) Ltd.	C320	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—
English Steel Corporation Ltd.	D541/438	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Ether Ltd.	C700	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Finney Presses Ltd.	D241	X	—	—	—	X	X	—	—	—	—	—	—	—	—	—
Foster, Yates and Thom Ltd.	D504	X	—	X	—	—	—	—	—	X	—	—	—	—	—	—
Funditor Ltd.	D324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
General Electric Co. Ltd.	C503/402	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—
Herbert, Alfred, Ltd.	D310	X	X	—	X	X	X	X	—	—	—	X	—	X	—	—
Hopkins, E. C., Ltd.	D741	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
Hupfield Bros., Ltd.	D724	—	X	—	—	—	—	—	—	—	—	—	X	—	—	—
Londex Ltd.	C722	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Mills, John, and Co. (Llanidloes) Ltd.	D337	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Neill, James, and Co. (Sheffield) Ltd.	D515	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
P.A.M. Ltd.	C416	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Projectile and Engineering Co. Ltd.	D209	—	X	—	—	—	X	—	—	—	—	—	—	—	—	—
Radio Heaters Ltd.	C219	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—
Rockweld Ltd.	D537	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—
Rotherham and Sons Ltd.	D624	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Rudd, E., and Co. Ltd.	C216	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
Turner Bros. (Birmingham) Ltd.	D512	X	—	—	—	—	X	—	—	—	—	—	—	—	—	—
Turton Bros. and Mathews Ltd.	D413	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Venner Time Switches Ltd.	C711	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Windsor, R. H., Ltd.	C231/110	—	X	X	—	—	X	X	—	—	—	—	—	—	—	—

Plastics Exhibits (excluding machinery) at Castle Bromwich, Birmingham.

Exhibitor	Stand No.	Moulding powders	Laminates	Extrusions	Bonding materials	Mouldings and other end uses: Electrical industry	Radio and television	Engineering components and tools	Textile machinery	Motorcar parts	Aircraft/ shipbuilding	Building materials, including flooring	Sanitary fittings	Builders' hardware	Furniture	Tank linings and chemical plant	Protective coatings and packaging
Airscrew Co. and Jicwood Ltd.	D.726	—	—	—	—	—	—	—	—	—	X	X	—	—	—	—	—
Angus, George, and Co., Ltd.	D.711	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—
B.B. Chemical Co., Ltd.	D.108	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—	—
Bakelite Ltd.	C.404	X	X	—	—	X	X	X	X	X	X	X	—	X	X	—	—
Birkbys Ltd.	C.417	X	—	—	X	X	—	X	X	X	X	—	X	—	—	—	—
Bowker, S. O., Ltd.	C.705	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
British Celanese Ltd.	A.327	X	—	X	—	—	—	—	—	X	—	X	—	X	—	—	X
British Insulated Callender's Cables Ltd.	C.513	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
British Moulded Plastics Ltd.	C.614	—	—	—	—	X	X	X	—	X	—	—	X	—	—	—	—
Capon Heaton and Co. Ltd.	D.712	—	—	X	—	X	—	X	—	X	—	—	—	—	—	—	—
Cellon Ltd.	B.527	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
Clang Ltd.	C.215	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
Croda Ltd.	D.122	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
Davis and Timmins Ltd.	C.316	Metal inserts for plastics mouldings				—	—	—	—	—	—	—	—	—	—	—	—
Evered and Co. Ltd.	B.327	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—
Gandy Ltd.	D.147	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hall and Hall Ltd.	D.729	—	—	X	—	X	—	—	—	—	X	—	—	—	—	—	—
Holoplast Ltd.	B.315	—	X	—	—	—	—	—	—	—	X	X	—	—	X	—	—
I.C.I. Ltd., Plastics Division	D.412	X	—	—	—	X	—	—	—	—	—	X	X	—	—	X	X
Ioco Ltd.	D.701	—	X	—	X	X	—	X	—	—	—	X	—	—	—	—	—
Langley, London, Ltd.	C.226	—	X	—	—	X	X	—	—	—	—	—	—	—	—	—	—
McArd, Robert, and Co. Ltd.	B.619	—	—	—	—	X	—	X	X	—	—	—	X	—	—	—	—
Moulded Products Ltd.	C.614	—	—	—	—	X	X	X	X	—	—	—	X	—	—	—	—
New Insulation Co. Ltd.	C.210	—	—	—	—	X	—	X	X	—	—	—	—	—	—	—	—
Resinoid and Mica Products Ltd.	C.416	—	X	—	—	X	—	X	—	—	X	—	—	—	—	—	—
Rockweld, Ltd.	D.537	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
Shires and Co. (London) Ltd.	B.700	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
Streetly Manufacturing Co., Ltd.	C.307	—	—	—	—	X	X	—	—	—	—	—	X	X	—	—	—
	C.208																
Telegraph Construction and Maintenance Co. Ltd.	C.413	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
Temple Press Ltd.	D.111	Publishers of "Plastics"				—	—	—	—	—	—	—	—	—	—	—	—
Thor Hammer Co.	A.638	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—
V. and E. Plastics Ltd.	C.111	—	—	—	—	X	X	—	X	X	—	—	—	—	—	—	—

breathing. The unit operates screw-down-type valves, and can therefore be fitted to presses operating off an accumulator supply as well as to self-contained units. It was developed jointly by Bradley and Turton, Ltd., and Arcolectric Switches, Ltd., of East Molesey.

British Jeffrey-Diamond, Ltd. (D.526)

This company is again showing their 15-in. by 8-in. "Atomill" fine grinder, which is a completely self-contained unit. An enamelled, streamlined, steel cover encloses the machine completely and also serves as a guard for the vee-rope drive. From feed material sizes up to ½ in. cube, the "Automill" reduces certain materials down to 300 B.S. mesh in one operation. It can handle up to 40 cwt. per hour, depending upon the type of material and product size required.

The "Microid Atomill" is a high-speed swing hammer pulverizer employing the same principles of construction as the "Atomill," and though designed principally for laboratory work it is robust enough for small batch production.

Barlow-Whitney, Ltd. (C.306)

Electrically heated pots and tanks have been developed by this company for plastic dip coating processes, which are now being widely adopted for the protection of machined parts, tools, etc.

Richd. W. Carr and Co., Ltd. (D.234)

On this stand steels suitable for making plastic moulds, dies and hobs are well represented. Several steels are available depending on the particular requirements of the customer, the type of material to be moulded, and the desired length of life of the die.

Christy and Norris, Ltd. (D.403)

This company makes disintegrators and pulverizers for grinding a variety of materials including moulding powder and plastics sprues. Their "Briton" grinder, complete with cyclone, is exhibited in larger size than formerly. The chief feature of this machine is that one-half of the top remains stationary, so that any feed fixture is not interfered with when screens and beaters have to be changed. Laboratory mills and magnetic separators are also supplied.

George Cohen Sons and Co., Ltd. (Outdoor Stand 1332)

The 50-ton "Coborn" hydraulic down-stroke press for plastics moulding is a totally enclosed, self-contained unit with power adjustable from 50 tons to approximately 10 tons. The cycle time, excluding curing or loading period, is 15 seconds; platen size 17 ins. by 16 ins.; total loading 5 kW. Temperature, controlled by thermostat, is adjustable from 200/400 degrees F. Another "Coborn" press, also exhibited, has a maximum power of 40 tons adjustable down to 8 tons. The platen size is 17 ins. by 11 ins., and maximum daylight is 8½ ins. Two of these 40-ton presses can be mounted on a common base plate for use as a dual unit, with one set of pumping equipment operating both presses.

T. H. and J. Daniels, Ltd. (D.310)

T. H. and J. Daniels, Ltd., are exhibiting plastics moulding plant on the above stand, which is shared with their sole U.K. selling agents, Alfred Herbert Ltd. The Daniels exhibits are confined to a transfer unit and a preforming machine. The 125-ton transfer unit is especially commended to those moulders who prefer the orthodox column type "non-streamlined" press. It is fitted with the Daniels process timer to give an automatic moulding cycle. The Daniels 2B preforming machine is producing tablets for use in the above press, which is moulding workshop drill stands by the transfer process.

E.M.B. Co., Ltd. (D.240)

The 50-ton upstroking press at this stand is a self-contained model in which heavy steel side frames have been substituted for the old round-type pillars, giving greater rigidity and enabling the adoption of proper slides for the moving platen, with large and adjustable wearing surfaces. The machine is in operation, producing plastics mouldings.

Funditor, Ltd. (D.324)

Marking machines and accessories for marking plastics and machines for sawing plastics are exhibited on this stand. The

"Sand-jet" marking machine produces a permanent clear-cut mark by means of a short blast of fine grit and a rubber stencil or mask. An electric timer can be set for periods from 0.5 to 10 seconds to give different depths of marking. This company also make an electrically heated drying and pre-heating oven.

Finney Presses Ltd. (D.241).

The 100-ton transfer moulding press to be seen at this stand, is entirely self-contained, all-hydraulic in operation, and equipped with solenoid operated valves for automatic cycling. It consists of an upstroking unit of the four-column type, fitted with two pull back rams. The top fixed platen is incorporated in a bolster, which is electrically heated and contains the machined transfer plunger "pot". Designed for pellet operation, the bolster has been so arranged to provide a considerable degree of pellet pre-heating, thus increasing the speed of operation. The pump unit is a two-stage type, delivering 24 gallons per minute at 200 lb. per sq. in. and 1 gallon per minute at 1½ tons per sq. in., and by means of isolating valves the transfer unit can be shut off and the press used as a simple compression machine if required. Automatic control is accomplished by means of electric solenoid operated valves in conjunction with pressure switches and timers, the complete cycle being started by pressing a button switch.

Finney Presses Ltd., are also exhibiting their 30-ton open-throat type Arbor press; the G.M.F. type hydraulic accumulator (for which a variety of sizes from 50 to 500 cubic ins. are available); the Finney heat circulating unit to operate on oil or water for securing the automatic heat control of moulds and platens; hydraulic control valves, ¼ in. to 3 ins., suitable for working pressures up to 6,000 lb. per sq. in., are designed for two-, three- or four-way control; pumping units and their well-known 50-ton dual transfer press.

Foster, Yates and Thom, Ltd. (D.504)

The 50-ton fully automatic plastic moulding press to be seen at this stand is the company's latest addition to its well-known "Lancastrian" series of hydraulic presses. It will mould up to six articles, having a total volume of 24 cubic inches at each pressing. The press operates on a fully automatic and continuous cycle, which includes the accurate measurement of the moulding powder, feeding to the moulds, pressing and de-gassing, opening, ejection of moulding and flash, and checking moulding before the cycle restarts. The functional design of the fully fabricated frame provides for adequate rigidity throughout the life of the press, and at the same time enables the pumping unit, all automatic controls and connecting piping to be housed within the frame, to form a fully self-contained unit with lines that are exceptionally clean.

The D.P. series of mixing machines are also shown. The design of these highly efficient mixing machines ensures an accurate and consistent mix without regard to proportions, grain sizes, or specific gravities of the ingredients. The mixing container is a cubic drum mounted diagonally on trunnions, and rotated quite slowly to produce a mixing action which resembles a "figure of eight," or interweaving motion. The method of mounting and rotating the drum completely eliminates "dead spots." No complications arise through centrifugal forces, and the mix is protected against harm, arising from either attrition or pulverizing. These machines can be supplied in sizes ranging from 10 lb. charging capacity up to 15 cwt. at Sp. Gr. 1.

Alfred Herbert, Ltd. (D.310)

Plastics machinery at this stand includes the Herbert-Reed-Prentice 5A injection moulding machine (capacity 4 oz.), the Edgwick type HY injection moulding machine, the Daniels 2B preforming machine, and the Daniels 125/28-ton transfer moulding machine. With the exception of the Edgwick machine, these exhibits will be in operation.

The Daniels preforming machine is suitable for making tablets up to 1½-in. diameter by ¾-in. deep. The machine has been designed to deal not only with normal grades of phenol- and urea-formaldehyde, but also with those grades which require higher pressure and are difficult to feed. Its main features are easy external adjustment and a wide speed variation, a tablet counter incorporated on the top cover, interlocking safety guards, dust extraction, and enclosure of all working parts.

Hupfield Brothers, Ltd. (D.724)

This company are again showing their 1 oz. and 2 oz. capacity injection moulding machines, both models being in operation. No changes have been made in the design since the 1950 B.I.F., as these machines have proved most satisfactory in operation. Their plastics granulating machine will also be in operation on this stand. This machine will cut scrap mouldings and sprues, etc., at the rate of 80 lb. per hour. The machine is completely self-contained, with a 2 h.p. electric motor.

Londex, Ltd. (C.722)

A complete range of relays, contactors, process timers and pressure and vacuum switches is exhibited by this company. Among new instruments is a self-resetting multi-circuit timer (type PR/ROY) for continuous cycling. In can be used to "stagger" the starting load of a number of pumps, etc., and to start up many processes where a number of operations have to be carried out in a regular timed sequence.

John Mills and Co. (Llanidloes), Ltd. (D.337)

The 6-ton hydraulically operated press to be seen at this stand finds innumerable applications in fitting and assembly shops. It is entirely self-contained, being complete with "Oilaulic" pump, electrical equipment and driving arrangements, pressure gauge for indicating the applied load, and dual-lever control, powered by a 2 h.p. 1,440 r.p.m. motor with multi-vee belt drive. The pump is a combination of a multi-ram high-pressure unit and a low-pressure rotor, which provides two speeds to the ram. The rapid approach speed of 180 inches per minute automatically changes to the working speed of 50 inches per minute when the ram makes contact with the work. The ram has a spring loaded return, and the maximum ram stroke is 6 ins. Daylight at the bottom of the stroke is 8 ins. minimum. The maximum pressure applied can be regulated by an adjustable relief valve located at the top of the frame. The press illustrated has a plain table measuring 12 ins. by 13½ ins. with a central hole of 2½ ins. diameter, but can be supplied in non-standard forms suitable for specific work. Alfred Herbert, Ltd., are sole agents for these presses.

Projectile and Engineering Co., Ltd. (D.209)

A complete range of "Peco" injection moulding machines (2-oz., 4-oz., 6-oz., 8-oz. and 16-oz. capacities) incorporating many distinctive features in design, are shown by this company.

The 2-oz. and 4-oz. capacities are self-contained machines. They are built on a prefabricated base unit, and incorporate direct hydraulic lock action. A high plasticizing capacity, together with a high rate of injection and extremely simple mould setting arrangements, makes these machines highly suitable for either long-run production or short single-cavity trial runs.

The 6-oz. and 8-oz. capacities are built on a three-unit principle, giving great mould accessibility, and contain the one-piece steel frame construction which ensures increased rigidity, and reduced elongation and deflection, and avoids trouble due to flexing. Mould closing is carried out by fully balanced quick-acting toggles. Adjustment of the nozzle and the tailstock platen is by a central control, thus ensuring easy mould set-ups, and to facilitate sprue removal, the headstock platen is provided with two hydraulic push-off cylinders which are quickly operated and give ample access to the rear of the platen and nozzle.

The 16-oz. machine is a recent addition. It incorporates many of the tried and proved features of other "Peco" models, embodying low centre height (only 47 ins.) which permits easy operation of the machine and together with retractable tie-bar greatly assists in the setting-up of moulds.

Radio Heaters, Ltd. (C.219)

Examples from the well-known range of "Radyne" plastic pre-heating equipment are displayed. The new 3kW model H25/A, which plasticizes up to 2 lb. of moulding powder per minute, will be in operation at the South Bank section of the Festival of Britain.

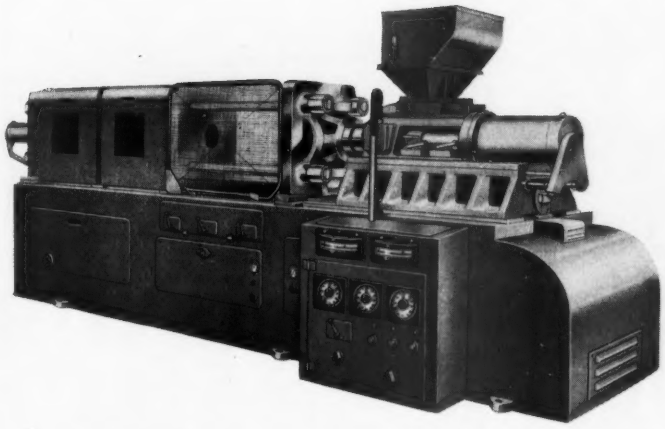
The shortage of phenol is causing an increased percentage of cresol to be used in plastic moulding powder. The greatly increased cure times experienced with cresol make the use of radio frequency pre-heating equipment essential if full production is to be maintained. Coal shortage, coupled with the increased demand for plastic moulding powder, is also liable to accelerate the movement from phenol towards cresol moulding powders. This is causing many moulders to increase their plastic pre-heating plant at the present time.

Radio Heaters, Ltd., are also manufacturers of welding equipment for thermoplastic sheet material. Their new 500W W5/A is suitable for spot welds, bar welds up to 12 inches in length, or contour welds up to 18 inches in length, on all normal grades of p.v.c. sheeting down to .005 in. thick. It is available with either vertical or horizontal electrode actions.

R. H. Windsor, Ltd. (C.231/110)

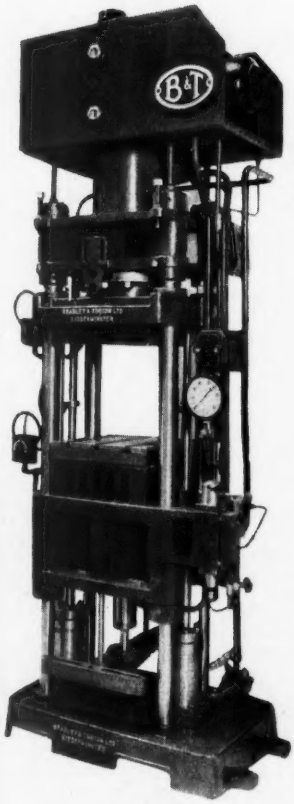
The range of plastics machinery exhibited at this stand includes the S.H.4 injection moulding machine (4 oz.), with automatic time cycle control, plasticizing capacity 25/35 lb. per hour, mould closing pressure 150 tons; and the S.H.8/10 injection moulding machine (10 oz.) with hydraulically operated retractable injection unit and automatic time cycle control, plasticizing capacity 40/45 lb. per hour, mould closing pressure 250 tons. The injection unit, which comprises the material cylinder, hydraulic pressure cylinder, together with the hopper and feed mechanism, can be advanced and withdrawn for easy accessibility.

Here, also, is the R.C.65 multi-screw

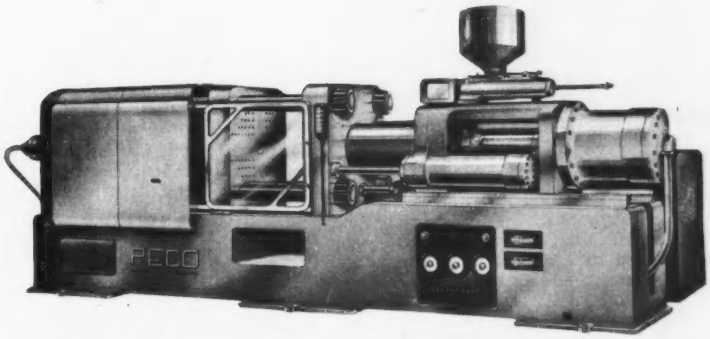


Windsor S.H. 8/10 injection moulding machine (10 oz.). (R. H. Windsor, Ltd.)

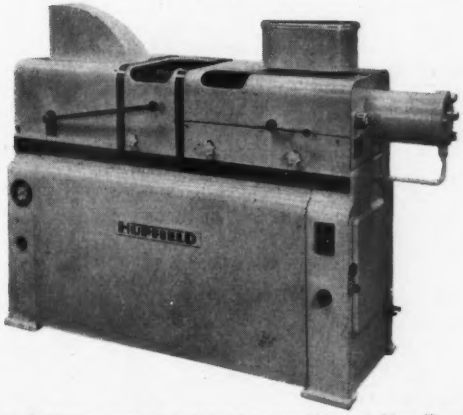
Windsor R.C. 100 multi-screw extruder (100 lb./hr.) (R. H. Windsor, Ltd.)



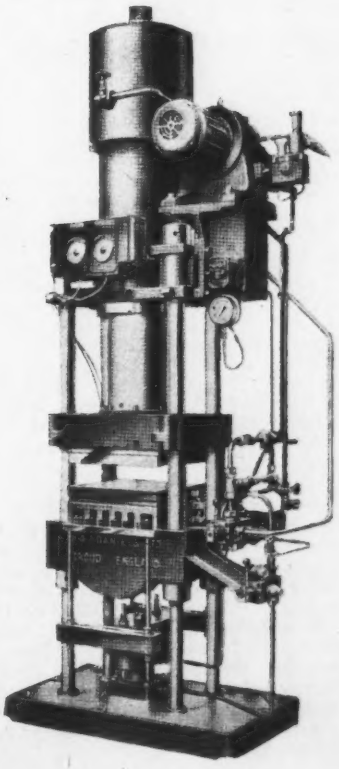
(Left) Self-contained semi - automatic moulding press (75/10 ton). (Bradley and Turton, Ltd.)



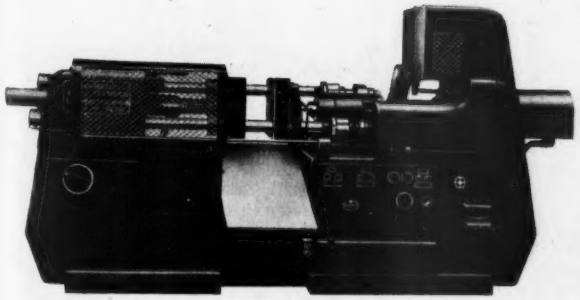
"Peco" injection moulding machine (16 oz.). (Projectile and Engineering Co., Ltd.)



Hupfield semi-automatic injection moulding machine (2 oz.). (Hupfield Bros., Ltd.)



(Right) Daniels 125/28 ton transfer moulding press. (Alfred Herbert, Ltd.)



(Left) Herbert-Reed-Prentice 5A injection moulding machine (4 oz.). (Alfred Herbert, Ltd.)

extruder, average output 65 lb. per hour, twin screw, driven by a 5 h.p. motor, with three-speed gearbox, forced feed lubrication to all points, automatic hopper feed synchronized with screw speed, electrical heating to barrel and die with control cabinet incorporating three controlling pyrometers. A similar machine, the R.C.100 multi-screw extruder, has an average output of 100 lb. per hour, and is driven by a 10 h.p. continuously variable speed motor. These multi-screw extruders are exceptionally useful for compounding and colouring moulding and extrusion compounds in vinyl, cellulose and polystyrene materials.

All machines exhibited by R. H. Windsor, Ltd., are equipped with "Windsor" moulds, dies and take-off equipment.

Materials, Mouldings and Extrusions

Robert McArd and Co., Ltd. (B.619)

"Celmac" plastics lavatory seats in black and in a range of colours to harmonize with sanitary ware, and textile and general engineering components in plastics, are the principal features by this exhibitor.

Bakelite Ltd. (C.404)

"Bakelite" and "Vybak" plastics are being used for innumerable essential purposes in many essential industries. Four industries—aircraft engineering electrical engineering, mechanical engineering and communications (radio and telephony)—have been picked out for special attention and the central features of the stand are a series of panels devoted to these industries.

A new phenolic moulding material, X17163, has been specially developed to meet the growing demand for miniaturized equipment. Its improved electrical properties and the ease with which it may be moulded make it ideal for miniature valve bases, plugs and sockets, and a selection of these are on view. Other exhibits include "Bakelite Laminated" silent gears and pinions and water-lubricated heavy-duty roller bearings, moulded cathode ray tube bases, wire and coil windings impregnated with "Bakelite" insulating varnishes, and wires and cables covered with "Vybak" sheathing materials. The furniture on the stand incorporates "Warerite" laminated plastics, manufactured by Warerite, Ltd.

Birkbys Ltd. (C.417)

This exhibit consists of various "Elo" phenolic products and includes completed mouldings; moulding powders; resins for all bonding, laminating and impregnating purposes; insulating varnishes; anti-friction resins for fabric bearings; casting resins; filling compounds and sealing fluids. A number of completely assembled articles utilizing various "Elo" products are also shown.

British Celanese, Ltd. (A.327/226)

The exhibit of British Celanese, Ltd., which is on the Derby Corporation Stand, shows, within the limits imposed by its relatively small size, the versatility of "Celanese" plastics. The display includes "Clarifoil" transparent film, "Celastoid" sheeting, "Celastoid" extrusions, and "Cinemoid" non-flam sheeting as supplied from the factory before conversion, and examples of current conversions of these materials to end-uses ranging from spectacle frames to window cartons.

Evered and Co., Ltd. (B.327)

"Everite" plastics builders' hardware, plastics standard trim for makers of cabinets, electrical appliances, etc., and "Everine" plastics cabinet hardware, are displayed in great variety by this company, as on former occasions of the Fair.

Ioco, Ltd. (D.701)

"Zapide" vinyl-coated leathercloths and "Formapex" resin-bonded laminates in form of silent gears and electrical insulation are two of the principal exhibits at this stand.

Holoplast Ltd. (B.315)

This stand is designed to demonstrate the use of the unique "Holoplast" products, one of which is the use of $1\frac{5}{8}$-in. panels as an exterior wall, an application which has been successfully used in a number of different types of building throughout the country. "Holoplast" internal partitioning is also shown in a typical office construction. The laminated plastic corrugated sheet, marketed under the trade name "Corroplast," is exhibited as a roof sheeting.

Imperial Chemical Industries Ltd., Plastics Division (D.412)

Uses of I.C.I. plastics in the engineering industries are shown here. Particular attention is given to the use of nylon moulding powder for the moulding of small bearings, rings and similar components where the toughness and self-lubricating properties of this material can be exploited. Polythene tubing for water service lines are also shown and the technique of jointing and welding is demonstrated. Other features relate to the use of polythene film for protective packaging, and polythene chemical plant made from granules or sheet material. "Perspex" acrylic sheet for machine guards, canopies and screens, as well as corrugated "Perspex" roof lights, in clear and coloured grades are on view, as also "Diakon" industrial mouldings, particularly electrical accessories.

Resinoid and Mica Products, Ltd. (C.416)

This company is a manufacturer of plastics, mica and micanite insulations. It is showing injection and compression mouldings, and machined components in laminated sheet and rod.

Stabel Products, Ltd. (D.760)

New types of plastic bobbins for the textile industry are shown here for the first time. The larger type is made with laminated "Bakelite" flanges, and has been specially developed for use with nylon and glass fibres, for which extremely strong bobbins are needed to withstand outward pressure. The spare-end bobbin, also exhibited, is now increasing in use as more automatic looms are being installed. The operative no longer has the time to wind up the spare ends on a container, as was the previous practice. One flange is made readily detachable so that the collected yarn can be easily removed. Also shown are plastic pirns, selvedge bobbins and beams for the narrow fabrics industry.

Streetly Manufacturing Co., Ltd. (C.307)

A representative selection of mouldings in urea, melamine, phenolic and thermoplastic materials can be seen at this stand.

A large panel displays the larger mouldings; other units show in greater detail the stages in moulding or finishing some of the smaller or intricate mouldings. Included are printed mouldings, showing the various stages in printing and stoving a three-colour overprinting; the moulding of one well-known product incorporating components made in seven different materials is fully dealt with. Other subjects include injection mouldings; electrical plugs and switches; bottle, jar and tube caps; and the moulding of a special beaker. The mouldings displayed on the principal panel include electrical meters, slip rings, control knobs and handles, radio cabinets and ventilating and refrigerating components.

Moulded Products, Ltd. (C.614)

This company manufactures precision mouldings for the electrical, electronic and telecommunications industries which are normally sub-assemblies for products marketed by other firms. A number of examples of this class of work are exhibited. Also shown are the M.P.L. fireman's helmet and lavatory seats moulded in pastel shades of wood-filled phenolics. The earflap arrangement to the helmet is a recent development.

Miscellaneous

Miscellaneous exhibits of plastics interest at the Birmingham Section of the Fair are tabulated below:—

Aerialite, Ltd. (C.105).—Plastic cables.

Aerox, Ltd. (D.439).—Aerators and diffusers with moulded fittings.

Airscrew Company and Jicwood, Ltd. (D.726).—"Weyroc" man-made timber.

George Angus and Co., Ltd. (D.711).—Oil and heat-resisting mouldings.

B.B. Chemical Co., Ltd. (D.108).—"Bostik" industrial adhesives.

A. Bell and Co., Ltd. (B.420).—"Belvorex" plastics ware.

S. O. Bowker, Ltd. (C.705).—Moulded electrical wiring accessories.

British Insulated Callender's Cables, Ltd. (C.513).—Plastics insulated cables and accessories.

Capon Heaton and Co., Ltd. (D.712).—Hard and soft plastics extrusions.

Cellon, Ltd. (B.527).—"Birlon" temporary protective coating.

Compressed Rubber Products, Ltd. (B.715).—Mouldings in synthetic materials.

Crompton Parkinson, Ltd. (C.609).—"Nelson" stud welding gun, incorporating plastics moulded parts.

Davis and Timmins, Ltd. (C.316).—Metal inserts for plastics goods.

Gandy, Ltd. (D.147).—Laminated plastics products.

Hall and Hall, Ltd. (D.729).—Mouldings in synthetic materials.

India Rubber, Gutta Percha and Telegraph Works Co., Ltd. (D.615).—Ebonite mouldings, etc.; also "Sibronite" heat-resisting ebonite.

Langley (London), Ltd. (C.226).—Mica Micanite plastic tubes and stampings.

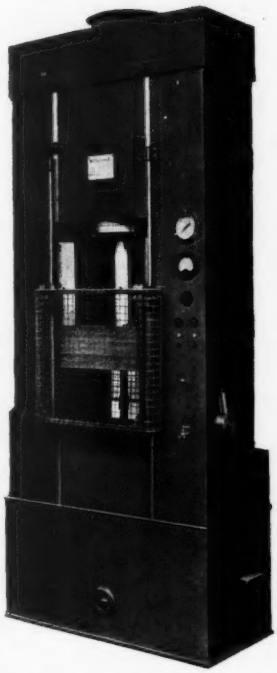
Permali, Ltd. (C.210).—"Permali" laminated densified wood.

E. Rudd and Co., Ltd. (C.216).—Machine engraving on plastics.

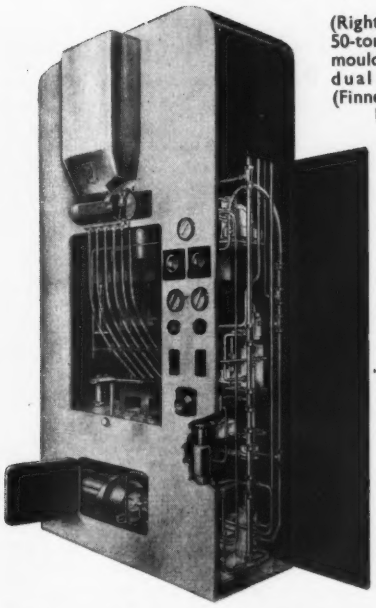
Telegraph Construction and Maintenance Co., Ltd. (C.413).—Plastics insulated cables and accessories.

Thor Hammer Co. (A.638 and D.233).—Soft-faced hammers with polythene heads.

V. and E. Plastics, Ltd. (C.111).—Plastics mouldings for electrical, radio, motorcar and textile industries.

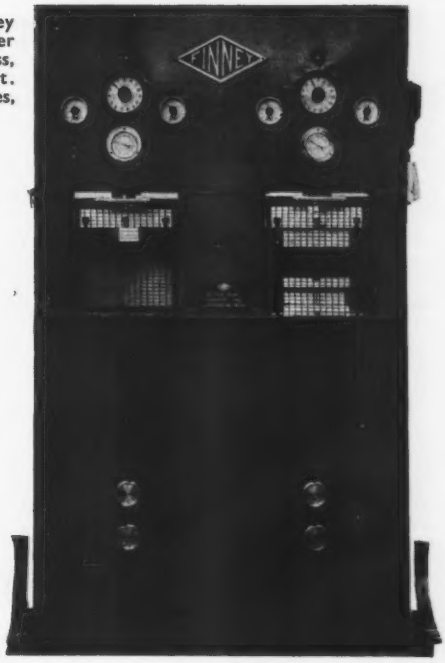


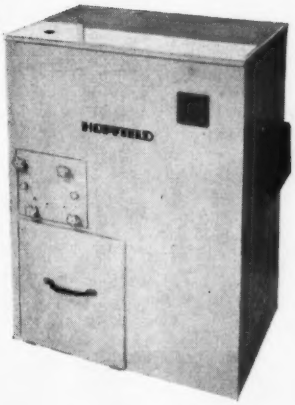
(Above) "Bipel" type 40 moulding press (pressure range 20-40-60 tons). (B.I.P. Engineering, Ltd.)



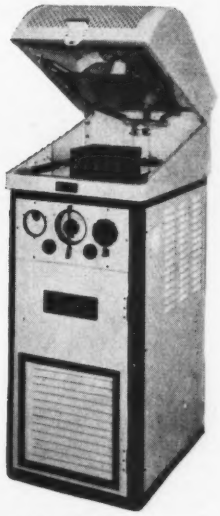
Fully automatic "Lancastrian" moulding press (50 ton). (Foster, Yates and Thom, Ltd.)

(Right) Finney 50-ton transfer moulding press, dual unit. (Finney Presses, Ltd.)

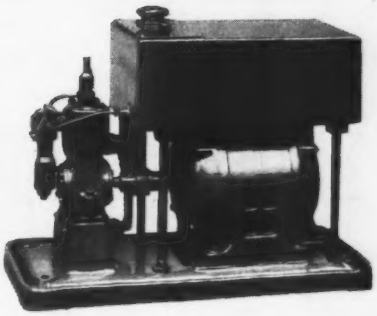




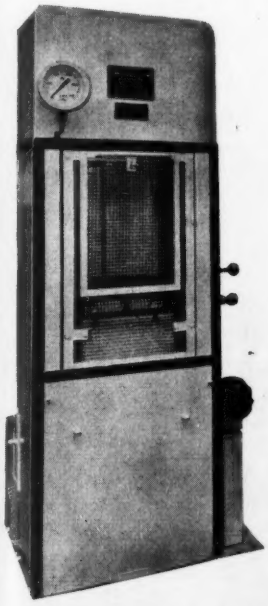
(Right) Granulating machine. (Hupfield Bros., Ltd.)



"Radyne" 3-kW preheater, model H25/A. (Radio Heaters, Ltd.)

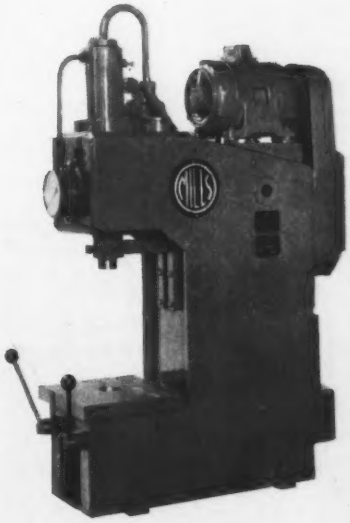


S-type pump unit. (Finney Presses, Ltd.)



E.M.B. upstroking press (25 ton). (E.M.B. Co., Ltd.)

(Left) Upstroking press (25 ton) with push back cylinders, and type A automatic control unit. (Bradley and Turton, Ltd.)



Self-contained hydraulic press (6 ton). (John Mills and Co. (Llanidloes), Ltd.)

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Water Carrier

Sir,—We wish to contact possible suppliers of plastic water carriers for caravan use. We enclose an illustration of the type of thing we require and should be glad to have comments as to the possibility of manufacture in plastics. We shall be interested in quantities of 1,000 or more at a time.

H. M. MEADOWS, LTD.
Colchester Road,
Ipswich.

[EDITOR'S NOTE: No water bottle of this shape or size has yet been made in plastics, although the outer plastic casing (moulded in two parts from "phenolics" or "urea") of the normal vacuum flask is a possible approach if the mid-way threaded joint was made water tight. Blown bottles of polythene are, of course, available, but not yet in the size indicated (16¾ ins. by 6¾ ins. diam.). A caravan water bottle seen at the 1950 Paris Fair was constructed from closely woven fabric and was fitted with a special polythene stopper.]

Metal Burrs

SIR,—Would you be so kind as to let us have the name and address of a firm who could supply us with small metal burrs suitable for the internal carving of plastics?

STARBYRN PRODUCTS.
Carrigaline, Co. Cork.

Substitute for Raw-hide

Sir,—We should be obliged if you would put us into touch with a manufacturer of plastic material which will substitute the hide in raw-hide mallets.

HUBERT H. P. TRIST AND CO., LTD.
Brislington,
Bristol, 4.

Tools for Working "Perspex"

SIR,—Could you kindly put me in touch with a firm that specializes in small tools, such as rotary and band saws, grinding wheels and mops, etc., for working "Perspex"?

S. GASSMAN.
6, Argyll Road,
Westcliff-on-Sea, Essex.

Instrument Covers

SIR,—We are interested in the provision of "slip over" covers for a number of our instruments. It is the writer's view that we want something partially opaque, like "Porosan," which seems to be an excellent material, retaining its flexibility over long periods. Alternatively, we could use material from which plastic curtains of good quality are made.

Can you put us in touch with manufacturers who could either supply us with the sheet material, from which we could make up these covers, or who might consider supplying the covers themselves in not very large quantities?

TAYLOR, TAYLOR AND HOBSON, LTD.
Technical Sales and Service Department.
Stoughton Street,
Leicester.

Industrial Gloves

SIR,—May we ask help in finding a source of supply of industrial gloves made from polythene?

SAMUEL JONES AND CO., LTD.
Camberwell, S.E.5.

Styptic Cases

Sir,—We shall be pleased if you would inform us of manufacturers of black or coloured plastic styptic cases.

POMPADOUR LABORATORIES, LTD.
Middle Pavement,
Nottingham.

S.R.V.B. Sheet

Sir,—We have an application which involves the need for a very high-quality S.R.V.B. sheet. A material which successfully meets the requirements is "Dialexene 100," which has a dielectric constant of 3.4 and a power factor of .0039 at 3,000 megacycles. We would be glad to know of a material available in this country exhibiting characteristics equal to or approaching these.

MARCONI WIRELESS TELEGRAPH CO., LTD.
Chelmsford.

Metallizing

Sir,—We should be glad if you would give us the names and addresses of firms who specialize in the metallizing of plastics.

JOHN F. MANN, LTD.,
143, Cannon Street, E.C.4.

Cribbage Pegs

Sir,—We are wishing to contact manufacturers of "turned" cribbage pegs, of which we are able to order 400 gross pieces at a time. If you could give us the names of suitable manufacturers we should be much obliged.

E. LEHMAN AND CO., LTD.
St. George Works,
Totteridge Lane, N.20.

Liners for Domestic Ware

Sir,—We are anxious to obtain supplies of plain plastic containers, eggcups, tumblers, etc., suitable for use as liners for composition mustard-pots, preserve jars, etc., and would be grateful for the names of manufacturers.

TRUSCOTT'S.
Wolborough Street,
Newton Abbot, Devon.

Injection Moulding

Sir,—We would be obliged for the name of a firm in the East Anglia area, preferably Ipswich or Colchester, able to undertake the manufacture of a small injection moulding, and to make a slight modification in the moulding tool which is available.

F. J. HENOCQ AND CO., LTD.
"Hillcrest,"
Belle Vue Road,
Sudbury, Suffolk.

Curtain Rods

SIR,—We are anxious to obtain the name of the manufacturers of "Plastirod" plastic-covered expanding wire curtain rods.

HOSKINS AND SEWELL, LTD.
Midland Works,
Bordesley,
Birmingham, 12.

Address Wanted

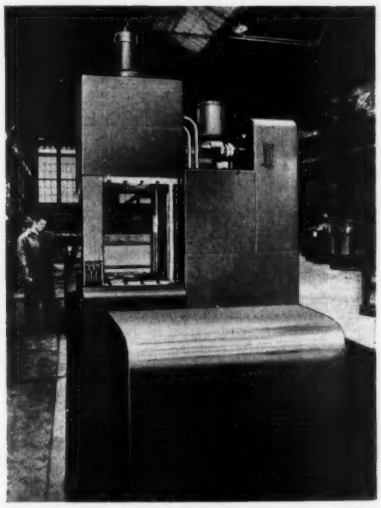
SIR,—We have received an order from one of our Australian customers for a quantity of plastic goods manufactured by Maguire and Robertson. Unfortunately they do not give us the address, nor can we find it in any works or reference at hand. We should therefore be glad to contact the firm concerned.

W. A. SPARROW AND CO., LTD.
4/7 Chiswell Street, E.C.1.

CORRECTION.—The novelty ashtray illustrated in our feature, "Plastics in the Service of Man," April, 1951, was described incorrectly as being manufactured by the Vogue Manufacturing Co., Ltd. This "Drunken Man" ashtray is, in fact, part of a series manufactured exclusively by Selcol Products, Ltd., 114-116, Charing Cross Road, London, W.C.2.

PRODUCTION NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes



NEW MOULDING MACHINE.—R. H. Windsor, Ltd., 16, Finsbury Square, London, E.C.2, the well-known manufacturers of extrusion and injection moulding machines for the plastics industry, by agreement with Jackson and Church Co., Saginaw, Michigan, U.S.A., are introducing to the United Kingdom, the Dominions and Colonies, Eire, India, Pakistan, and Europe, an entirely new development in moulding machines for the plastics industry. They have already made the first of these machines, to be called the J-C Universal moulding press, which will produce extra-large (48-oz.) injection mouldings at record speeds.

This new moulding machine is a complete departure from conventional design. It uses an extruder unit for heating the thermoplastic and forcing it into an injection chamber, and a vertical hydraulic press for clamping the mould and injecting the already well-plasticized material into the mould. The machine operates at a much lower pressure than normally, and is therefore cheaper to operate and maintain. It can be used for the compression and transfer moulding of thermoplastic material, as well as injection moulding.

Although the maximum capacity is 48 oz. (polystyrene) per shot, moulds requiring less than half that quantity of material have been satisfactorily used. Tests carried out at the Chessington works of R. H. Windsor, Ltd., have revealed that cycles were 20-50 per cent. faster and that mouldings were strain-free, due to the complete and uniform pre-plasticizing of the material in the extruder. Cycle follows cycle at 30-second intervals, the six main steps in the whole operation—plasticizing, feeding, injecting, clamping, cooling, and opening—being controlled by automatic timers. The machine will therefore deal with about 360 lb. of thermoplastics per hour (based on polystyrene).

As the injection piston only operates against material which has been completely plasticized by the extruder, injection pressures are very much lower than those normally met with. The complete absence of any torpedo, or spreader, in the injection cylinder is further reason why high injection pressures are unnecessary. Locking pressures are also comparatively lower (often 300-400 per cent. less than conventional machines).

The J-C Universal moulding machine requires only 96 sq. ft. of floor space. The extruder worm can be brought up to speed in less than one second, because the 30 h.p. electric extruder motor runs continuously, and is engaged and disengaged by a patented clutch.

NEW CELLULOSE ACETATE FACTORY.—James Nelson, Ltd., of Nelson, Lancs, Erinoid, Ltd., of Stroud, Glos, and Hercules Powder Co., Ltd., of London, announce that they have entered into a joint venture for the production of cellulose acetate flake in England. The plant, which is now under consideration, is located in Lancaster and is expected to commence operations in the early summer of 1951. Part of the cellulose acetate produced will be used by Nelsons Silk, Ltd., a subsidiary of James Nelson, Ltd., in its production of cellulose acetate rayon. Erinoid, Ltd., will use cellulose acetate from the plant for part of its requirements for the production of cellulose acetate plastics. The remainder will be distributed by Hercules Powder Co., Ltd., to industrial consumers.

GAUGE AND TOOL MAKERS' ASSOCIATION will have a composite stand at the Plastics Exhibition and Convention, to be held in the National Hall, Olympia, June 6 to 16, 1951. On this composite stand will be featured examples of moulds and dies, tools and other engineering equipment, as supplied by members of the Association to the plastics industry.

SWEDISH PLASTICS EXHIBITION.—The Swedish Plastics Federation, in co-operation with AB St. Eriks-Mässan (St. Erik's Fair, Ltd.), is arranging the first Swedish Plastics Exhibition to be held in Stockholm from May 12 to 20, 1951, in the Exhibition Halls of AB St. Eriks-Mässan, in Stockholm. The Spring Meeting of the Swedish Plastics Federation will be held in connection with the Exhibition, May 18 and 19, at Hotel Gillet, Stockholm. Further particulars can be obtained from Swedish Plastics Federation, Stockholm.

ASSOCIATION OF CHEMICAL AND ALLIED EMPLOYERS.—Mr. H. V. Potter, B.Sc., F.R.I.C., M.I.Chem.E., chairman and managing director of Bakelite, Ltd., has been appointed chairman of the Association of Chemical and Allied Employers. He has been a member of the Association's executive board since 1941, and vice-chairman since 1948. Mr. F. J. Robinson, M.B.E., A.R.I.C., M.I.Chem.E., was again elected vice-chairman of the Plastics Group.

SOCIETY OF THE PLASTICS INDUSTRY, INC., announce a change of address to 67, West 44th Street, New York, 18, N.Y.

ADHESIVES.—A five-day course on synthetic resin adhesives is being organized by Aero Research, Ltd. Lectures will be held in St. Catharine's College, Cambridge, while demonstrations and practical work will be at Duxford, the period being September 23-29, 1951. The fee for the course is £10 10s., inclusive of accommodation in college, meals and transport to and from Duxford and Cambridge. Application forms for enrolment may be obtained from Aero Research, Ltd., Duxford, Cambridge. Applications have already been received from many European countries and parts of the Empire.

"TERYLENE" COUNCIL.—A council has been formed to assume responsibility to the board of I.C.I., Ltd., for the "Terylene" project (working through the existing Divisional framework) and to co-ordinate research and development work in I.C.I. on all synthetic fibres, excluding nylon and "Ardil." Dr. A. Caress has been appointed chairman of the "Terylene" Council, of which the other full-time members are Mr. G. F. Whitby, Dr. R. Beeching, Mr. Rowland Hill (Dyestuffs Division), Dr. E. D. Kamm (Plastics Division) and Mr. W. F. Osborne (Plastics Division).

Dr. J. C. Swallow succeeds Dr. Caress as a joint managing director of the Plastics Division of I.C.I.

Mr. E. G. Williams has been appointed to the Plastics Division Board, and succeeds Dr. Swallow as research director.

LACRINOID PRODUCTS, LTD., announce net profit of £22,027 for the year 1950, after taxation. Debit balance brought forward from last year is £60,305, less transfer from share premium account £59,884, giving £421. Proposed dividend at 10 per cent., less tax, takes £9,130, leaving credit balance of £12,476 to carry forward.

Mrs. F. A. Garrett (wife of Mr. F. A. Garrett, director of Rootes Mouldings, Ltd.) replies after presentation by the Chairman of the P.I.G.S., Mr. Cyril Last, at the Society's dinner/dance held at the Savoy Hotel, London, on April 6.

INSULATORS, LTD., of Edmonton, have recently purchased the freehold factory, together with plant, of Associated Resin Products, Ltd., of Paddock Wood, Kent. This modern factory will be used by Insulators, Ltd., for the production of trade mouldings, and will materially assist to meet the constantly increasing demands made upon them for such products.

Insulators, Ltd., have realized for some time that the growth of the use of plastic mouldings, together with the wide range of materials now manufactured, calls for special techniques in production methods. It is their view that production units for trade mouldings can be operated at maximum efficiency so long as they do not exceed a certain size and capacity; also that the different techniques necessary between thermosetting and thermoplastic materials call for specialized production methods in each case. The wide and varied range of production items such as exist between technical mouldings of the engineering and electrical class, and, for instance, fancy goods, also require separate and specialized handling. With this in mind, a policy has been followed for some time which is fundamentally based on limiting the size of units of production and administering such units centrally.

A few years ago Insulators, Ltd., opened a modern factory at Jarrow-on-Tyne, Co. Durham, operating as a production unit controlled from Edmonton. The factory at Paddock Wood will further extend this policy, besides giving additional flexibility to the complete organization. The factories at Edmonton, Jarrow and Paddock Wood to-day provide facilities twenty times greater than the small factory which the company began operating 25 years ago. In those early days, production was confined to mouldings calling for a high degree of quality and accuracy for the electrical and engineering industries, and to-day such production still absorbs a major part of the plant. Administration operates from the Head Office of Insulators, Ltd., at Edmonton.

P. A. PERMUTA (PLASTICS), LTD., are not showing at the B.I.F. this year, but are having a separate display at the Piccadilly Hotel, London, W.1. Suites 306 and 417, from April 30 to May 11 (10 a.m. to 10 p.m. daily, Sundays excepted). They will be showing plastic household furniture, fancy goods, toilet requisites, toys, games, and industrial mouldings of all descriptions.

TENAPLAS, LTD., Upper Basildon, nr. Pangbourne, Berks, have recently received an order for 340 miles (1,700,000 ft.) of their plain, embossed and coloured p.v.c. beltings from a firm in New Delhi, and an order for a quarter of a million feet of thin-walled p.v.c. tubing from a firm in Calcutta.

THOMAS DE LA RUE AND CO., LTD., will be holding a private exhibition of their products at the galleries of the Royal Society of Painters in Water Colours, Conduit Street, W.1, from July 2 to 19. This will be the first time that products representative of all the company's activities, including laminated and extruded plastics, have been brought together under one roof. Admission to the exhibition will be by invitation. Applications should be made to Thomas De La Rue and Co., Ltd., 84, Regent Street, W.1.

British Plastics Convention

THIRTY-SIX papers will be contributed to the British Plastics Convention which is to be held concurrently with the British Plastics Exhibition at Olympia, London, June 6 to 16:—

INAUGURAL LECTURE.—Wednesday, June 6, 4 p.m. Chairman: P. A. Delafield, M.A.

The place of plastics in industry (Sir Ben Lockspeiser, F.R.S.).

PROGRESS IN PLASTICS MATERIALS.—Thursday, June 7, 10.15 a.m. to 12.30 p.m. Chairman: P. C. Allen, M.A.

Recent developments in phenolic moulding materials (J. H. Bennitt, F.R.I.C.).

The effect of cross-linking in vinyl polymers (J. J. P. Staudinger, Dr. Ing.).

Some aspects of solid polymers of ethylene (J. C. Swallow, Ph.D.).

PLASTICS IN THE CHEMICAL INDUSTRIES.—Thursday, June 7, 2.30 p.m. to 4 p.m. Chairman: E. H. T. Hoblyn, Ph.D., A.M.I.Chem.E.

Applications of plastics in the chemical and allied industries (Verney Evans, M.Sc.).

Thermoplastics in service, with particular reference to the application of unplasticized polyvinyl chloride (J. D. D. Morgan, M.Sc.).

VINYL FORMULATION AND COMPOUNDING.—Friday, June 8, 10.15 a.m. to 12.30 p.m. Chairman: N. J. L. Megson, D.Sc.

Characteristics of components and general principles of formulation of p.v.c. compounds (H. Jones, B.Sc. (Tech.)).

Production of vinyl plastics in dry powder form (S. J. Skinner, Ph.D.).

PLASTICS IN THE TEXTILE INDUSTRIES.—Friday, June 8, 2.30 p.m. to 4 p.m. Chairman: George H. Spencer.

Textile applications of aminoplastics (A. R. Smith, B.Sc.).

Plastics and their application to equipment in the textile industry (Alan Beecham, A.M.I.P.E.).

FORUM ON BUYING AND SELLING.—Saturday, June 9, 10.15 a.m. to 12.30 p.m. Chairman: Cyril S. Dingley.

Plastics from the domestic consumer's viewpoint (Stanley Carter, A.T.I.).

Selling plastics—the manufacturer's view (T. L. Birrel, B.Com.).

Certification marks and informative labelling (W. E. de B. Diamond, M.A., Ph.D.).

TRUE SYNTHETIC FIBRES.—Monday, June 11, 10.15 a.m. to 12.30 p.m. Chairman: H. V. Potter, B.Sc., F.R.I.C.

The physico-chemical background of synthetic fibres (Professor E. K. Rideal).

Terylene (A. Renfrew, B.Sc.).

PLASTICS IN BUILDING AND ARCHITECTURE.—Monday, June 11, 2.30 p.m. to 4 p.m. Chairman: R. J. Schaffer, B.Sc.

The architect and plastics (Gontram Goulden, A.R.I.B.A.).

What the plastics industry offers the building industry (H. H. Lusty, A.M.I.E.E.).

DEVELOPMENTS IN SYNTHETIC RESINS.—Tuesday, June 12, 10.15 a.m. to 12.30 p.m. Chairman: H. A. Collinson, F.R.I.C.

Some investigations into the fundamentals and applications of adhesives (N. A. de Bruyne, Ph.D., F.Inst.P.).

Synthetic resins as foundry sand binders (P. G. Pentz, B.Sc.).

Urea and melamine resins in surface coatings (F. Schollick, B.Sc.).

HOUSEWIVES' QUIZ.—Tuesday, June 12, 2.30 p.m. to 4 p.m. Question Master: Kenneth Horne. Mrs. G. Lovat Fraser, Mrs. Gaby Schreiber, C. F. Merriam and J. E. Sisson.

DEVELOPMENTS IN PROCESSING PLANT.—Wednesday, June 13, 10.15 a.m. to 12.30 p.m. Chairman: J. Lionel Daniels, B.Sc., M.I.Mech.E.

Plastics calendering—types of machines and layouts (Joseph Brown, M.I.Mech.E.).

Dies and take-off systems for thermoplastic extrusion (Edwin G. Fisher).

Basic features influencing the performance of injection moulding machines (E. Gasoar, Dipl. Ing. E.T.H. Zurich, A.M.I.Mech.E.).

PLASTICS IN THE TRANSPORT INDUSTRIES.—Wednesday, June 13, 2.30 p.m. to 4 p.m. Chairman: William Lyons.

Plastics in electrical engineering for the automobile industry (A. A. Tomkins).

Aircraft plastics structures (H. Warburton Hall, M.Sc., and J. E. Gordon, B.Sc.).

Plastics in ship construction (E. C. Leach, F.R.I.B.A.).

TECHNIQUES OF FABRICATION.—Thursday, June 14, 10.15 a.m. to 12.30 p.m. Chairman: James Butler, A.M.I.Mech.E.

Selection of phenolic moulding materials with regard to mechanical strength (Stanley A. Ede).

Continuous extrusion of thermosetting materials (D. N. Davies, B.Sc.).

Problems of mixing in extrusion (D. Grant, B.Sc. (Eng.), and W. Walker, M.A.).

PLASTICS IN SURGERY AND MEDICINE.—Thursday, June 14, 2.30 p.m. to 4 p.m. Chairman: H. Jackson Brown, M.D.

Synthetic resins and their internal applications in surgery (John T. Scales, M.R.C.S., L.R.C.P.).

A new method of making bronchopulmonary casts of human lungs (David H. Tompsett, Ph.D.).

The use of nylon film in surgical dressings (Professor John R. Squire, M.D., F.R.C.P.).

PLASTICS FILM PRODUCTION AND HANDLING.—Friday, June 15, 10.15 a.m. to 12.30 p.m. Chairman: V. E. Yarsley, D.Sc. (Zurich).

Plastics films—their manufacture and properties (Maldwyn Jones, B.Sc.).

Heat sealing and welding of plastics (G. Haim, Dipl. Ing., and H. P. Zade, Dr. Ing.).

Inks for the printing of plastics films (Hubert A. Idle).

PLASTICS IN PACKAGING.—Friday, June 15, 2.30 p.m. to 4 p.m. Chairman: Chairman of the Institute of Packaging.

Plastics as packaging materials (G. L. Riddell, Ph.D.).

Applications and manipulation of thermoplastic materials in the packaging industry (W. T. Simpson).

Films relating to the plastics industry will be shown each day 5 p.m. to 7.30 p.m.

New Productions

Horticultural Aid

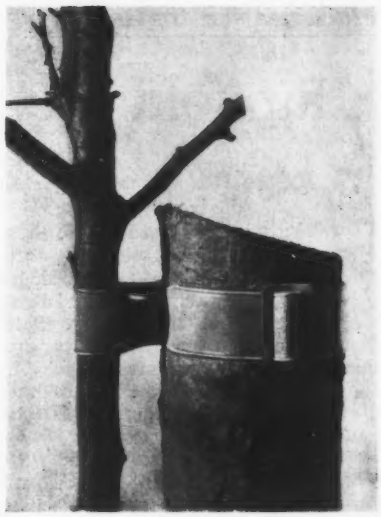
One of our photographs shows a new use for plastics in horticulture, the properties of p.v.c. being remarkably suitable for this purpose. The device consists of a 1-inch wide strip of p.v.c., complete with buckle and collar which permit of expansion in the girth of the tree. As the tree continues to grow, the direct pressure of the growing trunk on the relatively wide strap is sufficient to elongate the tie. The tubular spacing member serves to prevent abrasion between the tree and its supporting stake, and to act as a swivel permitting the use of upright, diagonal or cross-staking. The p.v.c., of course, is unaffected by sprays. The device is made and sold by S. H. Rainbow, 71, Quorn Gardens, Leigh-on-Sea, Essex.

P.V.C.-covered Garden Chair

A remarkably well-designed garden chair is to be exhibited at the Festival of Britain. It has been constructed by Ernest Race, Ltd., 22, Union Road, Clapham, London, S.W.4, to the specifications of Mr. E. Race, F.S.I.A., their director of design. As will be noted from the photographs, the metal springs (which are galvanized) are covered with extruded p.v.c. tube (supplied by BX Plastics, Ltd.), the springs themselves being fixed to the side members by metal attachments also covered with p.v.c. The p.v.c. extruded tube serves several purposes: to give smooth coverings to the springs for comfort in sitting on them; to make an all-weather covering to the springs, since drying, after rain has ceased, is more or less immediate; to induce damping of the springs. An ingenious point in the structure is the fact that the extruded p.v.c. is not fixed to the side members of the chair. Thus on sitting on the springs, the tubes are not exposed to stretching. About 900 of these chairs will be used at the Festival of Britain, requiring 6½ miles of p.v.c. tubing.

Foamed Packaging Material

The London Capsule Co., Empire Works, Mitcham Road, Croydon, has recently commenced the manufacture of a low-density plastic material which is marketed under the trade name of "Foma." This material is urea formaldehyde foamed to produce a fine cell-like structure, its natural colour being snow white. It is produced in block or flake form as required. The standard size block is approximately 3 cubic ft. (48 ins. by 24 ins. by 4½ ins.). The material has many advantages as a lightweight packing medium.

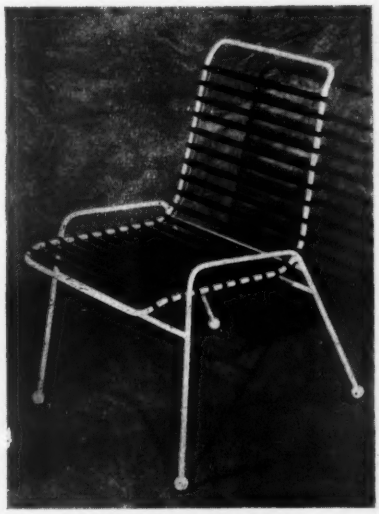


Horticultural aid (p.v.c.)

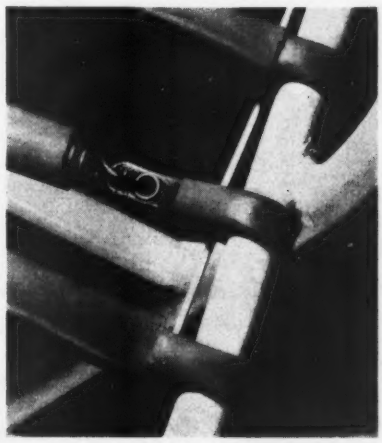
Cardboard cut-outs can be replaced by "Foam" which is cut into a small block to fit the carton, and small articles such as ampoules, phials, small bottles, etc., can be embedded in it. In this way the articles are held firmly in their own impressions. For packing larger articles the material may be used in flake form, thus eliminating the need for a variety of pre-formed materials.

The same material is also claimed to promote longer life, as well as a mount, for cut flowers. A piece of "Foma" is cut with a knife or cheese cutter to fit a vase or other container. This piece is submerged in water for three to four minutes to soak thoroughly. the soaked block is placed firmly into the vase and flower stems are pushed into it, ensuring that the stems do not go right through to the bottom of the vase. The "Foma" is kept moist but there should not be any free water in the vase. Should the vase or container be accidentally overturned, no water will be spilled. The same block may be used several times.

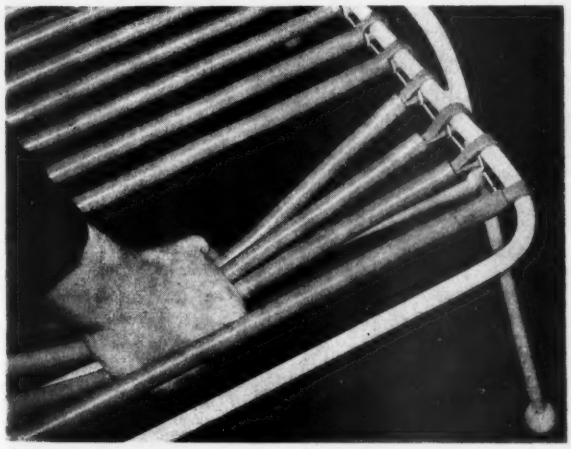
Due to the resemblance to snow, the use of these flakes and blocks for display purposes and film scenery has also been suggested.

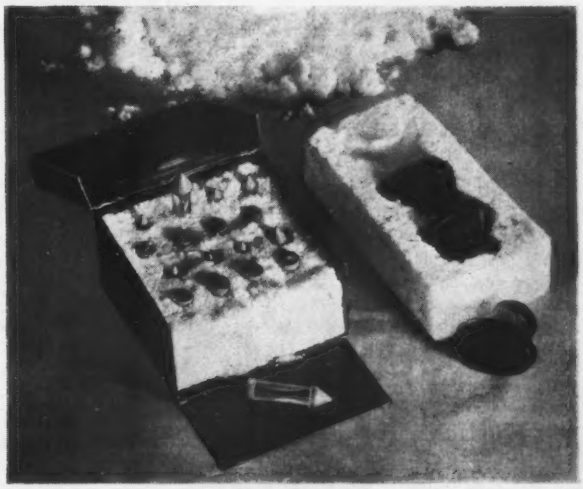


P.V.C.-covered garden chair.



(Above and below) Details of garden chair.





Foamed packaging material.

Machines for the Industry

Hupfield 2-oz. Injection Moulding Machine

In this article we describe a very useful semi-automatic injection moulding machine, completely self-contained, which was first noticed in "Plastics," April, 1948

IT was early in 1947 that Hupfield Bros., Ltd., of Stanmore, Middlesex, conceived the idea of producing a simple power-driven injection moulding machine for the plastics industry. Later that year a prototype machine was produced; and with a few modifications, by January, 1948, the first of a batch of 1-ounce capacity machines was despatched to a firm in Watford.

The model exhibited at the 1950 British Industries Fair showed still further improvements to the machine, which has now become a very popular injection moulding machine of its class. Also at the 1950 British Industries Fair was a 2-ounce capacity machine, exhibited for the first time, the same principles of the 1-ounce machine having been incorporated in this model, details of which are described in this article.

The Hupfield 2-ounce capacity injection moulding machine is semi-automatic, hydraulically operated and completely self-contained with electric motor. Both the moulding area, approximately 22 sq. inches, and weight of shot claimed on these machines can be exceeded with safety.

The machine is constructed with four rectangular tie bars which hold the fixed platen and the two end cylinder blocks in position. The spaces between the two tie bars on either side of the machine act as guides for the bearing blocks of the moving platen and the plasticizing cylinder block. Inside the base, which is of all-steel construction, welded together to form one complete unit, is a 23-gallon capacity oil tank to which is flange-mounted the electric motor. The hydraulic pump, which is completely immersed in the oil, is also flange-mounted for ease of alignment. The machine is completely enclosed, which is not only conducive to safety while operating, but avoids dust, etc., from settling upon the slides and working parts, thereby causing undue wear. The complete covering can be removed in a matter of two minutes.

Reference to Fig. 3 shows the patented quick-action toggle mechanism employed on this machine. When the hydraulic

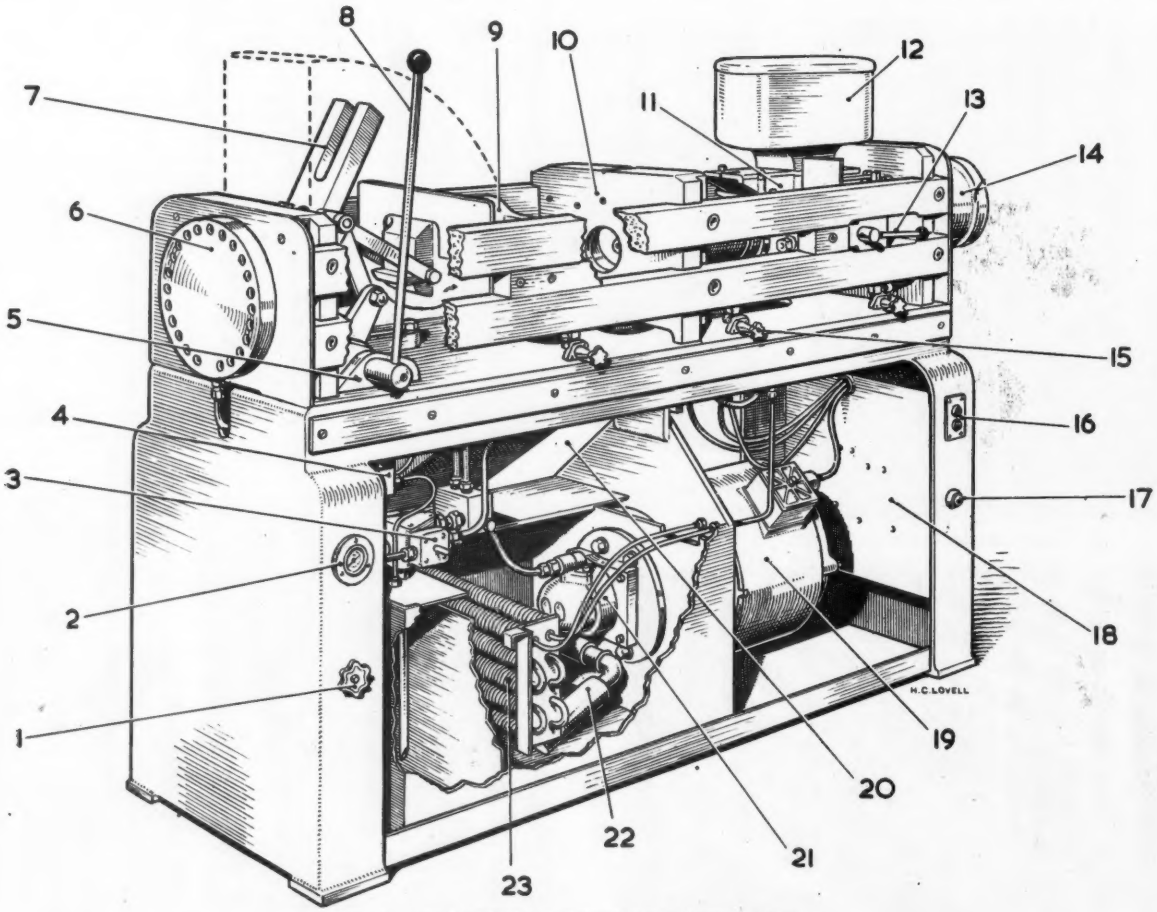


Fig. 1.—The Hupfield 2-oz. injection moulding machine.

1.—Pressure gauge cock. 2.—Pressure gauge. 3.—4-Way valve. 4.—Pilot valve. 5.—Cam. 6.—Mould locking cylinder. 7.—Pressure bar. 8.—Operating lever. 9.—Moving platen. 10.—Fixed platen. 11.—Automatic compensating feed. 12.—Hopper. 13.—Cam lever. 14.—Injection cylinder. 15.—Water valves. 16.—Motor starter. 17.—Heat indicator light. 18.—Electrical control box. 19.—6-h.p. squirrel-cage motor. 20.—Chute. 21.—Hydraulic pump. 22.—Oil filter. 23.—Gilled oil cooler.

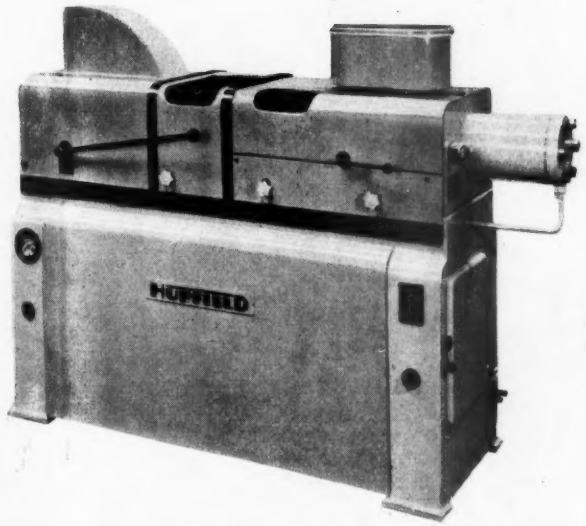


Fig. 2.—General view of the Hupfield semi-automatic injection moulding machine. 1 oz. and 2 oz. capacity.

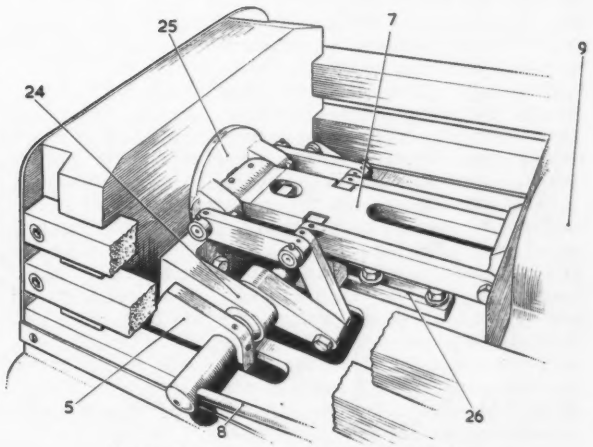
pump is working at maximum pressure, 2,000 lb. per sq. inch, a pressure of 44 tons is developed behind the mould-locking piston (25) and is transmitted direct along the pressure bar (7) to the moving platen (9) and mould. This pressure is actuated by fully depressing the operating lever (8); this rotates the cam (5), bringing a pilot valve (4), situated beneath the cam, into action. This in turn operates the automatic four-way valve (3) which directs the flow of oil to the cylinders. The toggle link system does not receive any direct pressure, because when the operating lever is depressed, the centre of the link system, which is spring-loaded, is drawn down below the centre line.

Fig. 4 shows the layout of the injection cylinder, which is made of chrome alloy steel, heat treated and ground, and is fitted with a stainless-steel torpedo to spread the material to the outer walls and provide for efficient heating. The cylinder is heated by means of two resistance bands (28) of 1,000 watts each which are clamped to the outside surface, the temperature being recorded on a thermometer (27). The combined heat of both bands is automatically controlled by a "Tem-Con" thermostat (29), which has a range of 130 to 280 degrees Centigrade. This thermostat will maintain perfect control to within ½ degree.

The material passes from the hopper into the automatic feed (11), which is self-compensating to suit any size moulding. The material then passes to the injection cylinder and, becoming plastic, is injected into the mould under a pressure of 11 tons. The cylinder will plasticize 18 lb. of material per hour. The injection cylinder nozzle may either be held continuously against the mould whilst the machine is in operation or made to part upon each withdrawal stroke of the injection plunger, to suit the particular type of moulding. This is accomplished by reversing the position of the cam lever (13) seen in Fig. 1.

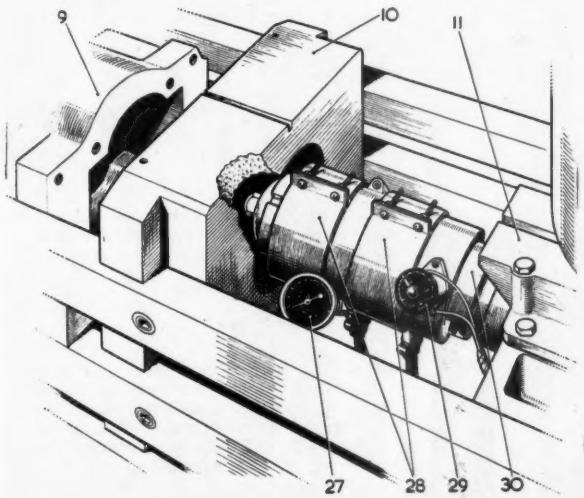
To avoid unnecessary complications the machine has been designed without mould adjustments, all moulds being a standard thickness of 5½ inches; this has the advantage of making mould changing a very quick and simple matter. Provision is made for water-cooling both halves of mould by connecting to valves (15).

Operating is by the one lever only (8): first the mould is closed by aid of this lever and, when fully depressed, operates the pressure as previously stated; this locks the mould and injects the plastic simultaneously. When injection is complete, the mould is opened by lifting the lever; this action withdraws the plunger from the injection cylinder automatically and releases the mould-clamping pressure, and by pushing the lever fully back, the moulded part is ejected, and can either be taken by hand or left to fall down the chute and pass into a box at the back of the machine.



5.—Cam. 7.—Pressure bar. 8.—Operating lever. 9.—Moving platen. 24.—Bearing. 25.—Mould-locking piston. 26.—Ejector adjustable stop.

Fig. 3.—Pressure bar and toggle mechanism.



9.—Moving platen.
10.—Fixed platen.
11.—Automatic compensating feed.
27. — Thermometer.
28.—Electric heaters.
29.—Thermostat.
30.—Ignition cylinder.

Fig. 4.—Injection cylinder assembly.

New Process for Collapsible Tubes

ALUMINIUM foil coated or laminated on both sides with a thin thermoplastic film is the material used in a new process for manufacturing collapsible tubes, such as are used in the packaging of tooth-paste, shaving cream, etc. Several important advantages are claimed due to the use of the plastic coating. By varying the composition of the plastic layer, corrosive substances such as mustard may now be packed in collapsible tubes. Names, instructions and advertising matter may be printed on the reverse side of the plastic film, giving a permanent marking which is protected against chipping, peeling and flaking.

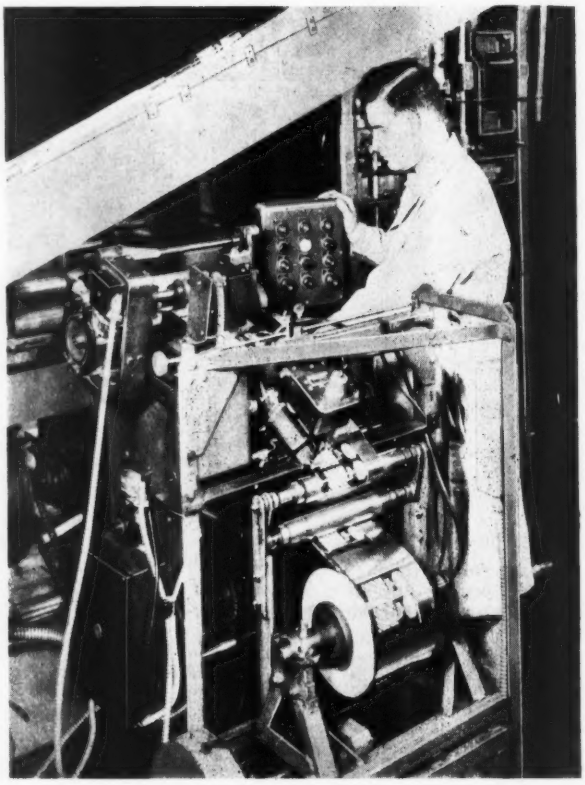
Where greater strength is required than is given by a single layer of foil, laminate tubes may be formed of double or triple-wound layers.

The new machine, developed by A.T.F. Incorporated, of Elizabeth, New Jersey, in collaboration with several packaging converters and suppliers, produces the finished tube in one process, starting with a roll of printed laminated foil weighing approximately 30 lb. The foil is guided into the machine, where it is cut and wrapped round mandrels. A cavity heater slides over the mandrel to form the tube cylinders by heat-sealing. These cylinders are automatically picked up and conveyed to the next stage, where the neck of the tube is formed by pleating and rolling, finally the thread being formed by pressing in split dies.

Mr. Thomas Roy Jones, President of the A.T.F. Incorporated has announced that several of America's largest and best-known users of tubes are now being supplied with the new tubes, in commercial quantities, after extensive tests by the users under rigorous packing, shipping and selling conditions.

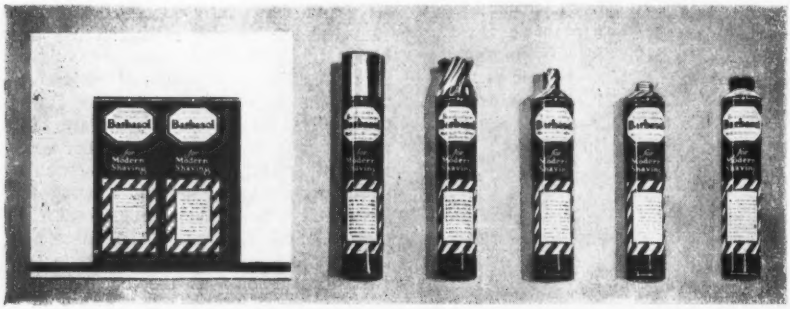
Tubes produced on the first two models of the A.T.F. machine are used for packaging shaving and pharmaceutical preparations. But the ability to vary the lining of the tubes to meet a wide range of packaging requirements has created considerable interest among food, pharmaceutical and cosmetics manufacturing companies, which believe the new produce will provide a more convenient device for packaging such items as cream cheese and jelly spreads, peanut butter, mustard, beauty aids and scores of other preparations. Testing of the tube with various liners for some of these purposes is now being carried out.

The choice of film for the outer ply rests on appearance and protection. The degree of transparency of the film is important in printing as it controls the effective use of the inks to make an eye-appealing design. At the same time, where and how the tube will be used is equally important, and consideration is given to whether the user will be handling the tube when his hands are wet and soapy, as in the case of shaving preparations, or whether they will be greasy, powdery, etc. Combinations of the various metal foils and films is limited only by the fact that the films must be heat-sealable for the tube-making operation.



Pre-printed foil of vinyl-aluminium-vinyl laminate is fed into the slitting and cutting mechanism of this automatic tube manufacturing machine.

(Above) Cake icing is one of the materials now being packed in this new type collapsible tube.



(Left) Steps in the production of a collapsible tube for shaving cream show pre-coated and pre-printed foil, the tube cylinder, steps in closing the cylinder, and finally the complete tube ready for filling.

Successful Designing for Plastics Moulding—XX

By W. M. HALLIDAY

In this article the author discusses matting, knurling and engraving, as means for improving surface finish and to increase the decorative qualities of a moulded component

MATTING is a convenient and inexpensive means employed by the designer for improving the decorative features and general surface finish of a moulded component. It is generally applied to large, flat surface areas lacking interest, which cannot be fluted or beaded.

The treatment is usually done to some definite pattern, and when it is used in conjunction with small beadings situated around the outer edges of the matted surface area, very pleasing results can be obtained with a minimum of trouble. It may also be used to impart improved gripping facilities to a component, or alternatively will serve to hide undesirable surface blemishes and defects which cannot be easily or wholly extirpated from the moulding.

Diagrams A and B (Fig. 1) depict the design known as the "diagonal" or "diamond" matting.

Positive Diamond Matting

Positive diamond matting, diagram A, consists of a regular series or pattern of small square conical impressions cut out in cameo fashion and formed to almost a sharp pointed apex. This point, in every case, lies exactly level with the main surface of the component wall. These square diamond impressions will be reproduced in the cavity by cutting or pressing the relevant wall surfaces of that mould with a suitable conically pointed end-milling cutter, or hob. If a cutter is employed, it would be traversed across the cavity surfaces to form a series of parallel lines spaced exactly the same distance apart as shown. Two series of lines will be employed these being located at right angles to each other, so as to leave the required dimensional shapes.

Unfortunately, however, this form of matting possesses two rather serious drawbacks. In the first place it will be somewhat difficult to reproduce in the mould cavity due to the fact that the apex of each diamond impression has to be located perfectly level with the surface of the part, thus necessitating intaglio formations in the cavity walls, etc. For that reason this style of matting will best be produced by means of a hobbing tool pressed powerfully into the mould block. The same hob required to reproduce the cavity contour and shapes will generally be used.

Further, the finished component will be more easily liable to damage and deterioration of its surface finish because of the tendency of the sharp pointed apexes of each diamond impression to snip and become ragged as a result of continued wear and handling.

Positive matting is best employed in connection with perfectly flat or only slightly crowned surfaces, especially when these are of large area and can be bounded at the edges by a pleasing form of beading, or a single flute. If employed in connection with greatly curved surfaces, increased difficulties would be encountered in machining the reverse kind of cavity impressions in the mould, and some discrepancies in respect of spacing and sizing of the "diamonds" might also occur.

Negative diamond matting, diagram B, differs from the positive variety in this manner: the top surface does not consist of a series of sharp points as with example A, but is located slightly below the surface, where, in place of the sharp points, will be a series of lines. A hollow diamond-shaped impression is therefore formed into the component, this being reproduced from a similar-shaped impression machined in the base or sides of the cavity in the mould.

These two diagrams show the relative sizes of squared diamond compressions employed. In practice the size of impression, of course, will vary with the extent of the surface area to be covered, and will usually range from about .050 in. up to about .250 in. per side of the diamond. The depth of impression, viz., the narrow channels between diamonds, on the exterior component, may vary from .010 in. to .045 in., according to the distance across flats of the diamonds.

When machining the cavity walls, etc., for the channels to reproduce diamond matting, a special conical pointed cutting tool will be required, in order to give the necessary angle of inclination to the sides of the small diamond-shaped impressions. For small surface areas a commensurately smaller size diamond impression will be preferable to obtain the most pleasing finished appearance. Large matting on very small areas, or vice versa, will give a very unbalanced effect, and to that extent will destroy the decorative value of the feature.

Negative Diamond Matting

The negative or reverse kind of matting shown at B (Fig. 1) is sometimes spoken of as the sunken type. It will probably give the best working results, because there will be no perfectly sharp points lying at the top surface of the component, as is the case with type A. Instead, such sharp crests of the diamond impressions will be situated slightly below the normal surface of the part, and therefore less liable to suffer damage during handling or use. This reverse or sunken type of matting also possesses the added advantage of enabling the finished moulding to withstand ill-usage and rather severe rubbing or handling actions far better than does the positive or raised type shown at A (Fig. 1). It can also be reproduced in the walls of the cavity formation with far greater ease, simplicity, and at less cost, especially when conventional machining methods of manufacture have to be adopted.

Fig. 2 depicts another successful and pleasing type of matting which, generally, will be found most applicable for small or medium-size surface areas, especially when the component is of square or rect-

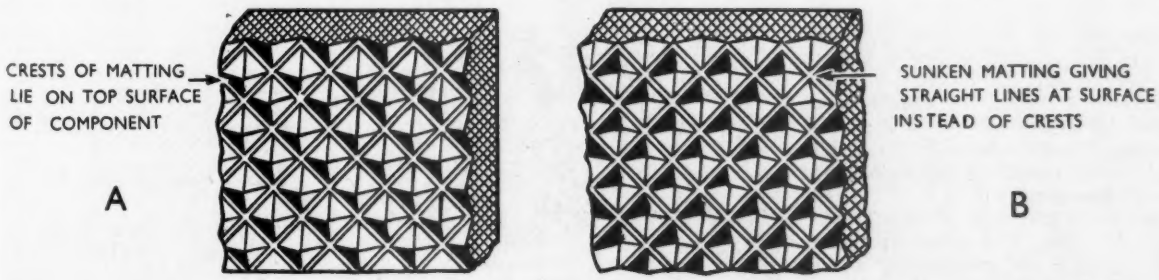


Fig. 1.—"Diagonal" or "diamond" matting.

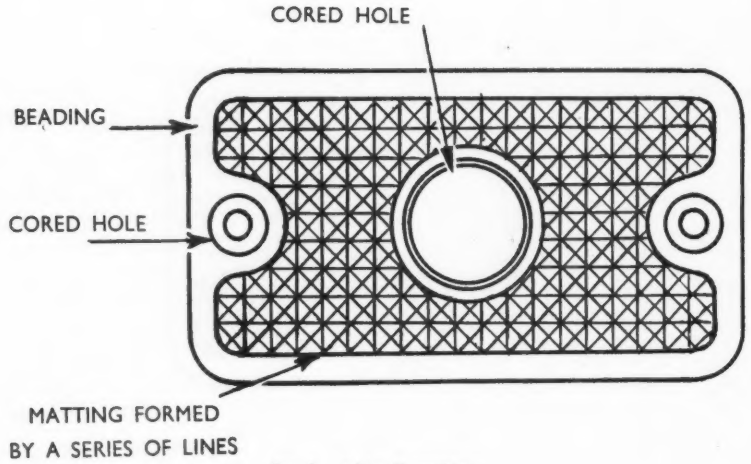


Fig. 2.—"Line" matting.

angular shape and has to be moulded with a perfectly flat top surface.

The example given is a flat lid or cover of rectangular shape for a hollow moulded container. This lid or cover has to be moulded with a large circular hole through the centre, the outer edge of which is bounded by a circular beading of shallow height. At each side of this hole, near the edge of the plate, plain bosses are formed thereon to the same height as the beading. These bosses are cored out for the small Vee counter-sunk fixing holes, by means of which the component may be fastened in place on the container body. A raised beading is also provided all round the external edge. The intermediate flat surface located slightly below these various beadings and bosses has to be matted to improve appearance and hide surface defects.

Line Matting

The form of surface finish applied in this instance is that known as "line matting." This consists of a pattern of slightly raised line impressions formed on the surface after the fashion depicted.

With this example each set of lines is made parallel. The first set is disposed across the length of the lid parallel with the longest sides. The second set of matting line is situated exactly at right angles thereto, thus producing a number of equal size squares. These small squares are still further intersected by a set of diagonal lines disposed at 45 degrees to the first, these diagonals passing through each of the four corners of every square impression. All these lines will, of course, be slightly raised above the normal surface of the cover component, but to obtain the best results their height should be maintained not greater than about .010 in.

One great advantage of this form of matting is that it can be reproduced easily, quickly and economically on the base of the cavity formations in the mould. Channels of fine line form have to be machined on the mould cavity surfaces, with the same diameter pointed cutting tool, which would be fed exactly to the same depth for every line. The best results will be derived by holding the depth of these channels to about .008 in.

When used in a definite regular geometrical pattern of the character here illustrated, numerous minor surface blemishes and irregularities may be effectively marked. This form of matting also affords an excellent hand or finger grip for components which have to be handled, although it is perhaps most suited for use on flat surfaces. Straight line matting would be employed in conjunction with square or rectangular surface areas, whilst curved line matting could be used with circular surfaces.

One feature worthy of note is that this matting can be carried right up to the side of beads or bosses without difficulty, and without producing any undesirable appearance faults. The parallel lines in every case should be situated very close together, i.e., at a pitching of not more than about .050 in. Very often a much closer spacing will give improved decorative finish to the surface. A cutter having its conical cutting edge inclined to an included angle of about 60 degrees will reproduce an excellent channel in the mould, as the sides of the matting lines must be inclined to avoid sticking or hanging of the component during ejection.

It will be appreciated from this description and accompanying illustration that, in practice, a large variety of patterns and spacings will be possible with this form of matting upon either compression or injection moulded articles. In selecting a particular pattern or size, much will depend upon the character and shape of the surface area to be covered. One interesting form which is very successfully employed on small surface areas with circular objects, embraces a series of circular lines, formed with a special fly-cutter.

With all these forms of matting the machining of the mould has to be done carefully to ensure that the lines, etc., are very accurately spaced. The finished surface and general appearance can be seriously marred by very small inaccuracies and discrepancies in the location or spacing of the lines, hence the need for making up special tools.

Raised "Dots"

Fig. 3 shows an interesting type of matting consisting of a series of slightly raised "dot" impressions which are distributed equally according to some pre-determined spacing and pattern over the surface to be treated. It is best suited for surface areas of small size, especially when the component has the surface broken by cored holes, ribs, bosses, or other features.

The example given, comprises a circular flat plate having a large radially elongated slot and two circular holes cored fully through the wall. The top edges of the elongated opening and the two cored holes are beaded as shown, and a substantial beading is also provided all round the periphery of the plate. It is the sunken plain surface lying between these various holes and beadings, etc., which is matted to improve appearance.

The slightly raised "dot" impressions are located approximately equi-distantly

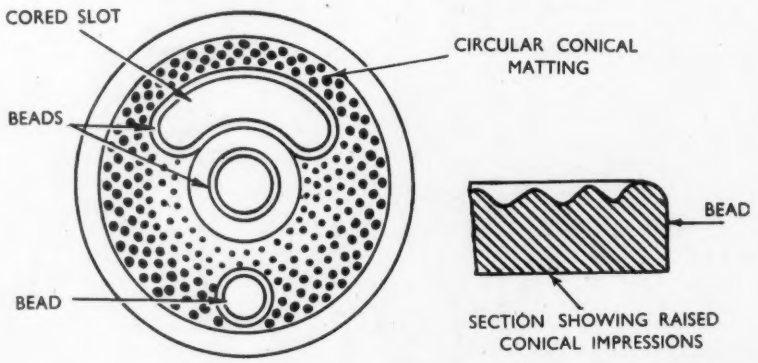


Fig. 3.—Matting in the form of "dots."

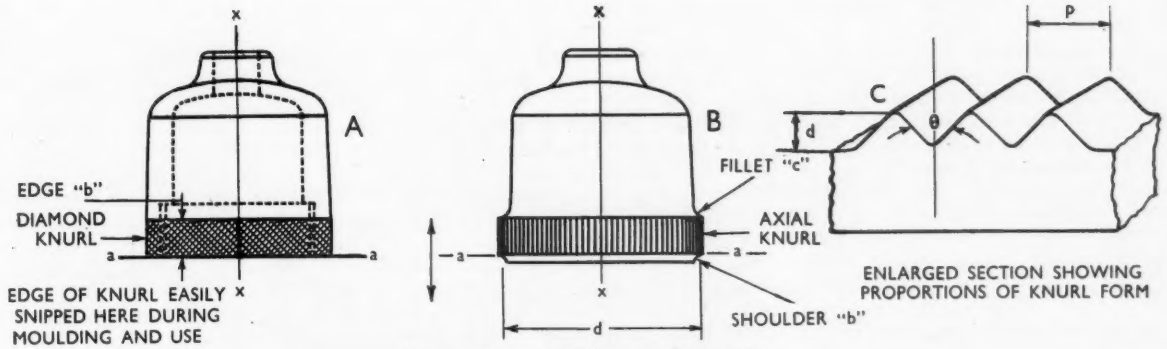


Fig. 4.—Conventional forms of "knurling."

apart, and are situated in regular rings (pitched on concentric circles, in fact), with the set of dots on one ring spaced midway between the dots on the next ring. Each impression is perfectly circular in outline shape and is slightly domed. All are made the same height and diameter, viz., the height should rarely be more than about .030 in., whilst the maximum diameter may be anything from 1/32 in. to 3/32 in., depending upon the extent of the surface area to be treated. The greatly enlarged section in the lower right-hand corner of Fig. 3, illustrates the domed form employed with this matting. To reproduce these impressions will require coincident depressions being machined into the base wall of the cavity in the mould, using a specially shaped domed type of cutting tool, of the usual end-mill variety.

This form of matting can be produced very easily and inexpensively by any of the usual machining processes available to the toolmaker, but it is particularly well suited for reproduction by the hobbing process employing a master hardened hob. This latter tool would, of course, be provided with the required dot impressions in raised cameo form so as to produce the necessary sunken intaglio cavity impressions in the mould. These in turn would give the identical raised impression on the surface of the component.

To a great extent the finished appearance will depend upon the size and spacing employed for the dot impressions. With very small surface areas, it will often be possible and, indeed, more convenient to space the dots visually, and when performed by an experienced toolmaker very good results will be obtained. Where moderately large surface areas are to be treated it will be necessary to control the spacing with greater exactitude.

If large-size circular objects have to be treated, an improved decorative effect may be derived by making the dot impressions large in diameter and in depth on the outer circles and gradually diminishing the size of impression as these approach the centre of the component. A variation of this character will easily be secured by regulating the depth of penetration of the cutting tool into the cavity wall surfaces, this being diminished a few thousandths of an inch with each circle of dots.

In producing this kind of matting it will also be possible to obtain a high degree of surface finish on the cavity impressions, since these would be readily accessible to the buffing or mopping facilities usually employed for such purposes. This form of matting also ensures excellent hand-and-finger gripping properties, but it is one specially applicable for flat or only slight-crowned surfaces.

When considering the selection of matting and any particular style, it will be advisable to bear in mind the possible effects arising in connection with the smooth ejection of the finished component from the mould. Unless the matting is of the correct form, i.e., raised on the surface of the component, and judiciously situated in respect of the normal direction of ejection, difficulties may arise when removing the part from the mould cavity. Certain critical wall portions, etc., of the cavity may be slightly undercut, or the sides of the raised impressions on the matted surface may offer interference to the free ejection of the part.

Knurling

Knurling is extensively employed in connection with moulded components whose function is to serve as a detachable cover, lid, cap, handle or knob, to be frequently removed or handled by the user. Such components can be moulded with what is known as a "knurled edge" to facilitate hand or finger gripping. Very often this form of surface treatment is employed for a purely decorative purpose on articles which do not have to be screwed or handled frequently.

Fig. 4 shows conventional forms of knurling and preferred features of design which will be found of interest. Examples A and B depict a simple cylindrical tubular cap which has to be moulded hollow and with the mouth portion of the hole threaded to fit upon the container. This would be formed from a mould parted along the line "a—a," the whole of the cavity formation for the external shape being carried in the stationary mould block, and the core plug for the threaded and plain holes mounted in the movable block. Thus a perfectly flat edge would be left at the lower (open) end of the component.

To facilitate handling and turning this cap, a narrow band of knurling is provided on the exterior of the part, this being located at the bottom end as shown. The form of knurling shown, i.e., "diagonal" or "diamond" type, would be undesirable and unsuitable for the cavity layout provided in the mould for the following reasons.

In the first place difficulty would arise in extracting the finished moulding from the cavity, because of the interference presented by the diagonal knurling on the exterior. These lines of knurl would, of course, be disposed at 45 degrees to the normal axis "x—x" of the component, which latter is also in axial alignment with the line of ejection movement.

To reproduce this form of diamond knurl on a moulding would necessitate parting the mould transversely around the component coincident with line "x—x" at right-angles to line "a—a." Further, splits would have to be employed with a compression mould, and slides in the case of an injection mould, so that the diamond-shape knurl could be produced and the component ejected without difficulty. These requirements would incur much additional cost in making the mould, and generally the component cost would be higher due to the slow-working speeds necessary with such intricate moulds.

There are several other important design points connected with this example which are worthy of some attention. For instance, it will be noted that where the narrow band of knurling is located, the outside diameter of the component is not enlarged in any way. This will mean that the upper edge "b" of the knurling will have to be blended out smoothly and evenly all the way round where it

joints onto the normal side surface of the cap.

Unless considerable care were taken when machining the cavity in the mould for such a knurled portion, an irregular line of termination of the band would result, which would detract considerably from the high-quality finish and appearance of the component. The lower edge of the knurled band is exactly level with the endface of the component, thus entailing that the knurled portion would terminate at this point with perfectly sharp corners. These would be prone to suffer damage by snipping, and rubbing away as a result of handling, etc. Further, the line " a—a " coinciding with the mould parting plane will be the point where flash could be expected on such a moulding; removal of such flash, especially if excessively thick, as might occur with a compression moulding, would incur some risk of damaging the knurled portion, which again would produce unsightly marring of the finish of the article.

A much preferable design is shown at B (Fig. 4). With this example instead of a diamond form of knurl, one of " straight " line form is used. This will prove considerably simpler and less expensive to reproduce in the mould, because it should be noted that it comprises a series of parallel shallow grooves disposed at right angles to the parting line " a—a," and thus they will be perfectly in axial alignment with the main axis of the workpiece, as denoted by line " x—x." This latter is also in agreement with the direction of ejection draw when the part has to be removed from the mould cavity.

With this arrangement, the knurled portion will present no interference to ejection, other than that due to normal radial contraction, which effects will usually be counteracted by the taper provided on the sides of the raised knurled grooves and projections. Further, it will be noted that the body of the cap is provided with a slightly enlarged shoulder or rim upon which the band of knurling is located, thus eliminating the probably irregular line of termination observed in connection with the example at A (Fig. 4).

On the extreme endface of the cap a short shoulder " b " is provided, this being slightly less in diameter than the knurled band portion. The sides of the latter are blended out to the bottom shoulder " b " and wall of cap by means of small fillets " c," as indicated. It should be specially noted that the maximum diameter " d " of this shoulder, where the same joins to the cap, is made slightly less than the diameter measured across the root of the grooves of the knurled band.

Various degrees of spacing of " knurl " may be employed, but usually finely pitched grooving will give the best appearance, except where very large diameters have to be treated. In the latter case, in order to economize in the machining of the mould cavity, instead of providing knurling wholly around the periphery of the component, strips of knurling may be formed, these alternating with a plain portion of the same radial length. Thus, three or four equally spaced strips, each of short length, may be employed.

The greatly enlarged section diagram at C (Fig. 4) indicates a very effective form and spacing for knurling, where the depth distance " d " is made from one-third to one-half the pitch (P) distance. This is a good proportion basis for most practical purposes when making up a knurling tool or hob. It will be noted, too, that the crests of the projections and the roots of the intermediate grooves are slightly rounded, whilst the sides of same are inclined. The included angle may be made from 75 to 90 degrees, according to convenience.

To produce knurled cavity surfaces will generally require making up a special tool, or hob, which will be powerfully pressed into the machined portion, and the appearance of the finished component will be conditioned by the accuracy and quality of such a tool, and the care bestowed on its use.

When selecting a particular form of knurling it will be advisable for the designer to bear in mind the machining problems likely to be associated with the reproduction of the forms in the mould cavity, endeavouring to minimize these as far as practicable. The simplest forms of knurl should be chosen, and the most accessible locations for same in respect of the reverse cavity formation wherein they have to be formed. Knurling, of course, is applicable only to curved surfaces, such as around the periphery of circular and oval shapes.

In the case of injection-moulded components, when determining the location and form of knurling, some regard will have to be paid to the gating provision employed in the mould. It will be unwise to locate the latter to feed the straight line into the knurl, because when the waste sprue is severed this will almost always leave an unsightly scar.

With compression mouldings it will be important to isolate the knurled portion from the normal flash line occurring on the component, otherwise a special trimming tool may be required to clean out the filled-in portions of the knurl.

(To be continued.)

Continuous Measurement of Plastic-covered Wire

A DIFFICULT problem of continuous measurement and control concerning the manufacture of plastic-covered wire has recently been solved by the Electronics Section of the National Physical Laboratory. Ideally, the overall diameter of the wire, which is extruded at great speed, should be constant, but in actual fact it is liable to vary because of changes in the extrusion rate of the plastic while it is warm and soft. It is, of course, possible to control the diameter by varying the speed at which the wire is drawn through the die, but this requires continuous measurement of the diameter under difficult conditions.

The wire, moving at speeds of up to 4,000 ft. per minute, passes through a water tank immediately after extrusion to cool the plastic coating, and then through a squeegee to remove the water. A certain amount of water, however, is carried along with the wire and is splashed on to any measuring device which must necessarily be placed after the tank where the coating is partly set. Even at this stage the material can be easily deformed and the pressure exerted by any measuring device must be limited to a few grammes to avoid flattening. The instrument to be used, therefore, had to be precise, but strong enough to stand constant wetting and the shocks produced by sudden variations of diameter.

These conditions have been met in a successful design based on an electronic micrometer developed by the Electronics Section at the N.P.L. In this device the wire passes between two rollers, one fixed and the other free to move according to the diameter of the wire coming through. Its movement is linked mechanically to a quartz crystal oscillator and varies the air gap in it. Any change of diameter in the wire then produces a change in the frequency of the oscillator signal. This is converted into a direct current proportional to the diameter and this current is used to control the speed of the motor drawing the wire so that the diameter can be kept inside the specified tolerance. The apparatus can be used over a wide range of diameters by adjusting the distance of the fixed roller from the free one.

While the method is capable of measuring changes of less than one-millionth of an inch, in this application the sensitivity is reduced since the normal tolerance required is only about two-thousandths of an inch. The calibration of the apparatus is stable for long periods in spite of the bad operating conditions.

first again

BM149

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The cabinet measures 36 inches high, 16 inches wide and 17½ inches deep. It weighs 32 lbs. The mould weighs 12 tons. The press used is a 1,500 ton hydraulic down-stroke, steam heated. The material is wood-filled phenol formaldehyde moulding powder formed into pellets and pre-heated in a R.F. Heater. All holes are moulded and four metal inserts are 'pushed in'. Speaker grille and control cover, not shown here, are separate phenolic mouldings.

this is the first British *console* television cabinet to be made from moulded plastics, and the largest plastic moulding in current production in Europe. Designed and produced for Sobell Industries Ltd. by British Moulded Plastics Ltd. at their Walthamstow factory, it proves that the very large 'phenolic' moulding is a practical reality.

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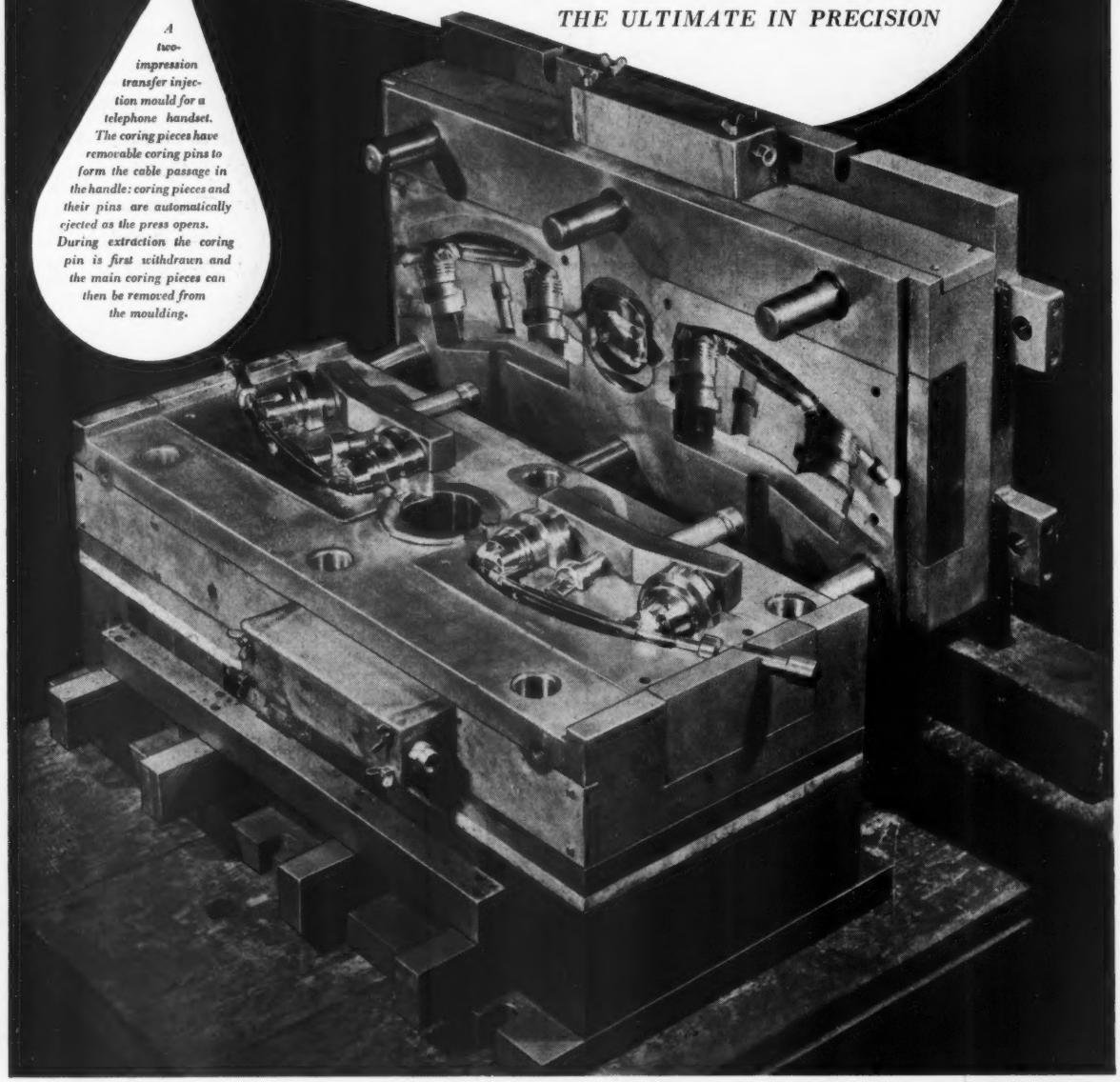

A two-impression transfer injection mould for a telephone handset. The coring pieces have removable coring pins to form the cable passage in the handle: coring pieces and their pins are automatically ejected as the press opens. During extraction the coring pin is first withdrawn and the main coring pieces can then be removed from the moulding.

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B·I·P GROUP

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2/- each.

B.P. 647,289. Appl. 2.4.48. Acc. 13.12.50.
Process for reducing the extensibility of nylon cords and the like. J. W. Illingworth. To: Dunlop Rubber Co.

Treatment of nylon fibres with a hot aqueous fluid, preferably steam, while the fibres are stretched. It is claimed that the extensibility is reduced by about 50 per cent. after the treatment.

B.P. 647,322. Appl. 6.8.48. Conv. (U.S.A.) 7.8.47. Acc. 13.12.50.
Preparation of polysiloxane resins. To: British Thomson Houston Co., Ltd.

B.P. 647,382. Appl. 22.9.48. Conv. (U.S.A.) 4.11.47. Acc. 13.12.50.
Reaction products of acrylonitrile and ketone aldehyde condensates. To: United States Rubber Co.

B.P. 647,479. Appl. 9.5.47. Conv. (U.S.A.) 29.12.44. Acc. 13.12.50.
Extruded tubing. C. E. Slaughter. To: Extruded Plastics Inc.

Manufacture of "rigid" tubing by extrusion from hot thermoplastic materials such as cellulose acetate, nitrate and butyrate, vinyl polymers and copolymers. The plastic material is extruded through an orifice and subsequently drawn down in one or more stages.

B.P. 647,492. Appl. 31.7.47. Conv. (U.S.A.) 14.5.41. Acc. 13.12.50.
Individual multi-layer fibrous resin bearing article. To: Keyes Fibre Co.

Die moulding of multi-layer laminated articles from an aqueous pulp mixture which contains fibres and a water-insoluble uncured resin. The preform is subsequently moulded in a conventional mould under heat and pressure.

B.P. 647,518. Appl. 22.11.46. Conv. (U.S.A.) 2.2.46. Acc. 13.12.50.
Plastic compositions and lacquers made therefrom. L. McCleary Geiger. To: The Neville Co.

Plastic composition comprising an organic polymeric material and a plasticizer containing a carboxylic acid.

B.P. 647,531. Appl. 1.8.47. Conv. (U.S.A.) 3.4.39. Acc. 13.12.50.
Improvements in or relating to moulded article. To: Hoosier Cardinal Corp.

Moulding of decorative articles such as push-buttons from transparent plastic materials. The decorative design is made in the form of moulded recesses of substantial depth in the rear face of the article.

B.P. 647,582. Appl. 16.10.46. Acc. 20.12.50.
Hydrophilic sheet materials impregnated with a combined plasticizer and fire-retardant and method of producing the same. To: American Viscose Corporation.

Cellulose esters, ethers or regenerated cellulose sheet material is plasticized and rendered fire-retardant by impregnation with guanidine thiocyanate.

B.P. 647,644. Appl. 7.5.47. Conv. (U.S.A.) 2.2.45. Acc. 20.12.50.
Method for producing articles sheathed with thermoplastic material. C. E. Slaughter. To: Extruded Plastics Inc.

Refers to a method of extruding continuously plastic tubing and feeding the articles to be protected simultaneously through the extrusion die. Following the extrusion a mechanical device is used to form individual packages which are subsequently severed. Used for packaging film rolls, cigarettes, batteries, etc.

B.P. 647,713. Appl. 4.10.46. Conv. (France) 30.7.46. Acc. 20.12.50.
Waterproof coatings. To: Sté des Usines Chimiques Rhone-Poulenc.

Waterproof coatings which are applied by dipping, spraying or painting. The coatings consist of finely powdered materials in combination with an organosilicic derivative, e.g., methyl chlorosilicane.

B.P. 647,717. Appl. 23.12.46. Conv. (U.S.A.) 1.5.46. Acc. 20.12.50.
Method for shaping sheet thermoplastic material centrifugally. To: Goodyear Aircraft Corp.

Addition to B.P. 619,675. Forming of acrylic sheet material and similar sheets into canopies, parts of fuselage, etc., by inserting the heated sheet into a mould which is rotated around one axis. Centrifugal forces form the sheet into the shape of the mould.

B.P. 647,727. Appl. 12.8.47. Conv. (U.S.A.) 13.8.46. Acc. 20.12.50.
Thermoplastic polymers. To: British Celanese, Ltd.

Copolymerization of styrene, methyl methacrylate with phenyl vinyl sulphone, using benzoyl peroxide as catalyst.

B.P. 647,762. Appl. 23.7.46. Acc. 20.12.50.
Dielectric heating apparatus. S. R. Tomes. To: Murphy Radio, Ltd.

Flexible electrode system for the high-frequency welding of plastic sheet materials. One solid electrode is used in co-operation with a slotted electrode which permits accurate alignment of electrode surfaces by virtue of a resilient construction and incorporated springs.

B.P. 647,896. Appl. 28.7.47. Conv. (U.S.A.) 22.12.38. Acc. 28.12.50.
Copolymers of vinyl chloride and vinylidene chloride and method of forming same. To: B. F. Goodrich Co.

B.P. 647,897. Appl. 28.7.47. Acc. 28.12.50.
Colouration of textile materials of organic derivatives of cellulose. H. C. Olpin and E. Stanley. To British Celanese, Ltd.

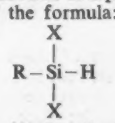
Colouration of cellulose acetate textiles with vat dyes being applied as a leuco compound in an aqueous medium.

B.P. 647,907. Appl. 14.8.47. Conv. (U.S.A.) 17.8.46. Acc. 28.12.50.
Plastic compositions suitable for use in making dilatable sealing elements To: British Thomson Houston Co., Ltd.

Manufacture of highly elastic plastic compositions based on polyvinyl chloride in conjunction with a temporary plasticizer. The plasticizer consists of monochlorotoluene and isophorone. The material is extruded into tubular shape and used for bottle caps and similar closures.

B.P. 647,940. Appl. 22.7.47. Conv. (U.S.A.) 2.10.44. Acc. 28.12.50.
Manufacture of organo halosilanes. To: Dow Corning Corp.

Refers to production of liquid higher alkyl dihalosilanes of the formula:—



Where R is an alkyl radical, X a halogen atom.

B.P. 647,970. Appl. 18.12.47. Acc. 28.12.50.
Synthetic resin films and process of making same. Comm. from: Firestone Tyre and Rubber Co.

Plastic film based on polymers or copolymers of vinyl chloride with up to 20 per cent. of other unsaturated compounds of the non-cross linking type. Cadmium dialkyl mercaptide is recommended as a stabilizer. High tensile and tear strength are claimed for the films which are calendered from this compound.

B.P. 648,001. Appl. 10.12.46. Acc. 28.12.50.
Production of emulsions, dispersions and solutions of methacrylic ester copolymers. J. E. O. Mayne and H. Warson. To: Vinyl Products, Ltd.

B.P. 648,022. Appl. 8.11.48. Acc. 28.12.50.
Toy vehicles. J. Johnston. To: Universal Injection Plastics.

Toy motor cars completely injection moulded from plastic materials such as cellulose acetate. Shaft assemblies are moulded together with wheels as complete units.

B.P. 648,250. Appl. 2.10.46. Conv. (U.S.A.) 16.10.45. Acc. 3.1.51.
Polymers of N-disubstituted amides of the acrylic acid series. G. D. Jones. To: General Aniline and Film Corp.

B.P. 648,251. Appl. 2.10.46. Conv. (U.S.A.) 16.10.45. Acc. 3.1.51.
Production of hydroxyalkylamides of acrylic acids and polymers therefrom. G. D. Jones. To: General Aniline and Film Corp.

B.P. 648,252. Appl. 2.10.46. Conv. (U.S.A.) 16.10.45. Acc. 3.1.51.
Water-soluable polyacrylamides and poly alpha-substituted acrylamides. G. D. Jones. To: General Aniline and Film Corp.

B.P. 648,253. Appl. 2.10.46. Conv. (U.S.A.) 16.10.45. Acc. 3.1.51.
Polymerization of alkylolamides of the acrylic acid series. G. D. Jones. To: General Aniline and Film Corp.

B.P. 648,254. Appl. 2.10.46. Conv. (U.S.A.) 16.10.45. Acc. 3.1.51.
Alpha-substituted N-hydroxyalkylacrylamides. W. O. Ney, Jr. To: General Aniline and Film Corp.

B.P. 648,281. Appl. 24.10.47. Conv. (U.S.A.) 27.11.46. Acc. 3.1.51.
Production of water-insoluble cation-active phenol formaldehyde condensation products. To: American Cyanamide Co.

Refers to U.S. Patent 2,228,159. New compound made by reacting phenol formaldehyde and a salt of sulphurous acid with a strong base and curing the reaction product at a temperature between 125 degrees and 175 degrees C.

B.P. 649,294. Appl. 31.5.48. Acc. 24.1.51.
Manufacture of thermosetting resins and moulding compositions. H. R. Fleck and G. B. E. Schueler.

Manufacture of thermosetting resin compositions by treating the resin of the

Wallaba tree with an aldehyde. Used for production of resin-bonded hardwood boards.

B.P. 648,354. Appl. 12.2.48. Conv. (U.S.A.) 17.6.44. Acc. 3.1.51.

Manufacture of urea formaldehyde resins. P. S. Hewett. To: Beck, Koller and Co. (England), Ltd.

Water-dispersible resin product for the impregnation of textiles. Particular stress is laid on pH control during manufacturing process.

B.P. 648,406. Appl. 31.12.47. Conv. (U.S.A.) 25.7.45. Acc. 3.1.51.

Process for making organo silicon compounds. F. J. Sowa.

B.P. 648,478. Appl. 15.6.48. Conv. (France) 13.8.47. Acc. 3.1.51.

Production of organo-polysiloxanes. To: Sté des Usines Chimiques Rhone-Poulenc.

B.P. 648,480. Appl. 22.6.48. Conv. (U.S.A.) 12.7.47 Acc. 3.1.51.

A process of preparing organo-siloxanes. J. F. Hyde. To: Dow Corning Corp.

B.P. 648,481. Appl. 24.6.48. Conv. (U.S.A.) 18.6.47. Acc. 3.1.51.

Production of alkylated alkylol melamines. A. J. Grossman. To: British Industrial Plastics Ltd.

B.P. 648,485. Appl. 30.6.48. Conv. (U.S.A.) 17.9.47. Acc. 3.1.51.

New plastic compositions, sheet material made therefrom and processes for making such materials. To: E. I. du Pont de Nemours and Co.

Calenderable composition comprising chlorosulphonated polyethylene and a polyoxyethylene glycol.

B.P. 648,513. Appl. 13.10.48. Acc. 3.1.51.

Production of polyesters. A. S. Carpenter, F. Reeder and E. R. Wallsgrove. To: Courtaulds, Ltd.

Manufacture of superpolyamide filaments with improved mechanical properties, in particular, capability of being readily cold drawn.

B.P. 648,658. Appl. 18.10.48. Conv. (U.S.A.) 11.2.48. Acc. 10.1.51.

Improvements in polymers. To: United States Rubber Co.

Process of making soluble air-drying resins from a mono-carboxylic acid and a suitable alcohol.

B.P. 648,733. Appl. 25.10.48. Acc. 10.1.51.

Medical and surgical dressings. J. R. Squire, J. P. Bull, P. A. Small and J. Browning.

Transparent surgical dressing made from film 0.010-in. to 0.001-in. thick. Material used is an N-alkoxymethyl derivative of a linear polyamide.

B.P. 648,812. Appl. 17.4.46. Conv. (U.S.A.) 18.5.45. Acc. 10.1.51.

Process for coating by means of thermoplastic transfer sheets. To: Sylvania Industrial Corp.

Phenol-furfural resin is used to form a coherent plastic film on a backing surface. After polymerization the film can be removed from the surface and is a coherent flexible sheet.

B.P. 648,830. Appl. 1.5.47. Conv. (U.S.A.) 1.7.46. Acc. 10.1.51.

Improvements in the manufacture of organic polymeric fibres. To: American Viscose Corp.

Polymeric fibres are extruded from a solution and prior to final setting are subjected to high-frequency sound-wave radiations. The fibres are stretched subsequently. Cellulose esters are quoted as fibre-forming materials.

B.P. 648,840. Appl. 29.7.47. Acc. 10.1.51.

Bonding surfaces containing polyvinyl resins. C. C. Johnson. To: E. I. du Pont de Nemours and Co.

Polymers and copolymers of vinyl chloride are used as a coating on paper or textiles in order to enable such sheets to be bonded to one another.

B.P. 648,844. Appl. 6.8.47. Conv. (U.S.A.) 3.12.42. Acc. 10.1.51.

Heat-reactive resin-impregnated sheets for adhesive purposes. To: Koppers Co., Inc.

B.P. 648,855. Appl. 10.10.47. Acc. 17.1.51.

Plastic compositions. T. Archer.

Manufacture of plastic mouldings which remain plastic by incorporation of a drying or semi-drying oil together with metallic dryers. An oxydized skin is formed on the outside of the moulding which prevents oxidation of the whole body and preserves its plasticity.

B.P. 648,892. Appl. 24.7.47. Conv. (U.S.A.) 19.7.46. Acc. 17.1.51.

Process for preparing new resinous copolymers and the new compositions resulting therefrom. C. F. Peters. To: Velsicol Corp.

A mixture of cyclopentadiene and an unsaturated ester of a monohydric alcohol and a carboxylic acid is heated at a temperature between 390 and 575 degrees F. to produce the copolymer. Application to nitrocellulose lacquers, etc.

B.P. 648,895. Appl. 27.8.47. Conv. (U.S.A.) 30.8.46. Acc. 17.1.51.

Methods and apparatus for converting thermo-softening material to the cellular condition. To: B. F. Goodrich Co.

Thermosetting material in sheet form is provided with a chemical sponging agent and passed through a high-frequency dielectric field between two conveyor belts. Contact with lower and upper electrodes is made via some pulverized dielectric material.

B.P. 648,900. Appl. 20.10.47. Conv. (U.S.A.) 14.11.46. Acc. 17.1.51.

Plasticized vinyl resin compositions and methods of preparing the same. To: B. F. Goodrich Co.

Butadiene acrylonitrile compounds as plasticizers for vinyl resins and copolymers of vinyl and vinylidene resins.

B.P. 648,959. Appl. 19.8.46. Conv. (U.S.A.) 17.8.45. Acc. 17.1.51.

Preparation of esters of 2, 3 epoxy propanol and polymerization products thereof. To: E. I. du Pont de Nemours and Co.

B.P. 649,001. Appl. 8.4.48. Conv. (U.S.A.) 9.4.47. Acc. 17.1.51.

Thermoplastic resinous compositions. G. O. Morrison and G. F. Metz. To: Shawinigan Products Corp.

Resinous binder based on polyvinyl acetate and Yacca gum. Application to the manufacture of gramophone records.

B.P. 649,038. Appl. 17.12.47. Conv. (U.S.A.) 18.12.46. Acc. 17.1.51.

Machines adapted for progressively seaming together two or more layers of sheet material by use of the heating effect of a high-frequency electric field. E. S. Welch. To: British United Shoe Machinery Co., Ltd.

High-frequency seam welder for plastics using two rollers between which the layers of material are passed. The weld is effected between a stationary bottom electrode and a reciprocating top electrode. Provision is made for accurate power control in the form of "pulses." The pulse duration is dependent on speed and controlled automatically. Addition to B.P. 645,406.

B.P. 649,041. Appl. 21.1.48. Conv. (U.S.A.) 21.1.47. Acc. 17.1.51.

Polymers of vinyl methyl naphthalenes. To: British Thomson-Houston Co.

Method of polymerization of monovinyl methyl naphthalene.

B.P. 649,046. App. 24.2.48. Conv. (U.S.A.) 27.4.44. Acc. 17.1.51.

Protection of articles against corrosion, abrasion or the like. J. J. Brophy, B. M. Pineles and R. C. Putnam. To: British United Shoe Machinery Co., Ltd.

Method of spraying a film-forming material, such as ethyl cellulose, and a plasticizer on to the articles to be protected.

B.P. 649,051. Appl. 16.4.48. Con. (U.S.A.) 19.4.47. Acc. 17.1.51

Resinous coating compositions for magnetic materials. To: British Thomson Houston Co.

Resin-type varnishes for insulation of laminations of electrical machinery based on paratertiary butyl phenol formaldehyde resin with a drying agent.

B.P. 649,103. Appl. 22.8.47. Con. (U.S.A.) 19.2.41. Acc. 17.1.51.

Production of polymeric material. To: B. F. Goodrich Co.

Refers to butadiene-acrylonitrile, butadiene-methyl methacrylate and butadiene-styrene resin emulsions and their polymerization.

B.P. 649,115. Appl. 18.12.47. Con. (U.S.A.) 26.9.44. Acc. 17.1.51

Manufacture of varnish resin interpolymers. To: Dow Chemical Co.

Addition to B.P. 621,542.

B.P. 649,120. Appl. 31.12.47. Conv. (France) 25.3.46. Acc. 17.1.51.

Method of producing a velvety surface on flexible bases of plastic compositions. G. Bernstein.

Plastic sheets are hot-calendered and a layer of fibres in random orientation is simultaneously applied to the surface by passing a belt with the fibres through the calender rolls. An appearance of "suede" leather is obtained in this manner.

B.P. 649,121. Appl. 7.2.48. Con. (U.S.A.) 19.3.47. Acc. 17.1.51

Preparation of haloaryl allyl carbonates and polymers and copolymers thereof. J. A. Bralley. To: B. F. Goodrich Co.

B.P. 649,164. Appl. 19.5.48. Con. (U.S.A.) 28.11.47. Acc. 17.1.51

Control apparatus for radio frequency heating. To: Singer Manufacturing Co.

Improved electronic circuit for power supply to high-frequency welding machines for plastics. Power is adjusted automatically to suit thickness of material between the electrodes of the welding machine.

B.P. 649,166. Appl. 4.6.48. Acc. 17.1.51

Preparation of mixtures of synthetic resins. T. A. Clayton. Comm. from: United States Rubber Co.

Refers to copolymers of butadiene-styrene and butadiene-acrylonitrile.

B.P. 649,173. Appl. 30.6.48. Con. (U.S.A.) 11.10.47. Acc. 17.1.51

Polymerization of organic compounds. To: E. I. du Pont de Nemours and Co.

Refers to polymerization products of ethylene dimethyl acrylate, diallyl diglycollate, diallyl phthallate, etc.

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Technical Note: ***Clean white plastic of good flexural strength was required and it was vital that the material used should be able to resist very low temperatures. The material finally chosen was co-polymer polystyrene.***

The moulding of the long narrow strips presented problems entirely new to injection moulding as, although the weight was well within the scope of the machines used, the lengths were considerably greater than the available platen area. The solution was found in a special technique in the design and mounting of the tool. For a full appreciation of the service we can offer, send your moulding problems to:—

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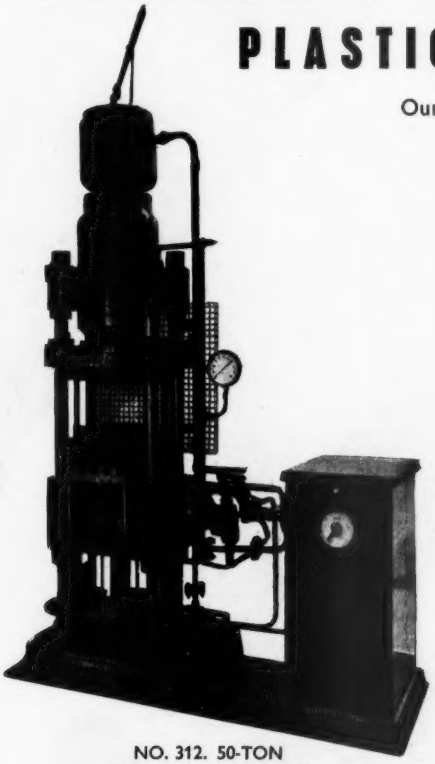

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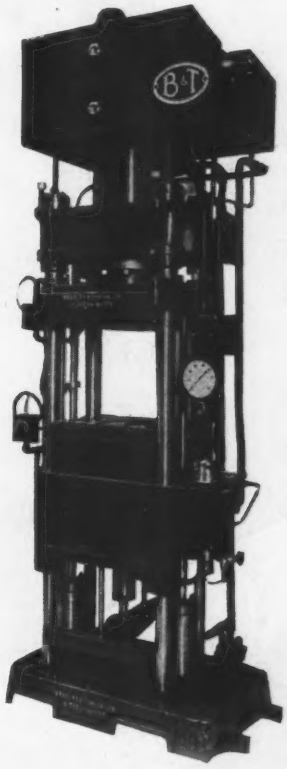

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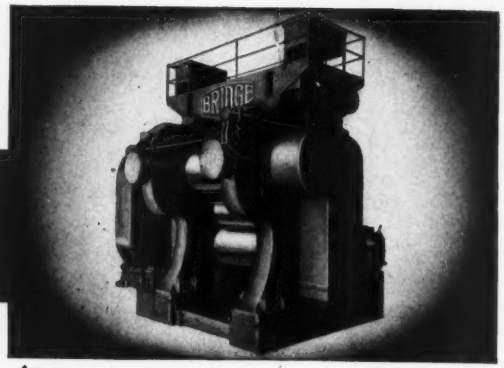
Precision Calender with three superimposed and one offset roller. Flood lubrication.



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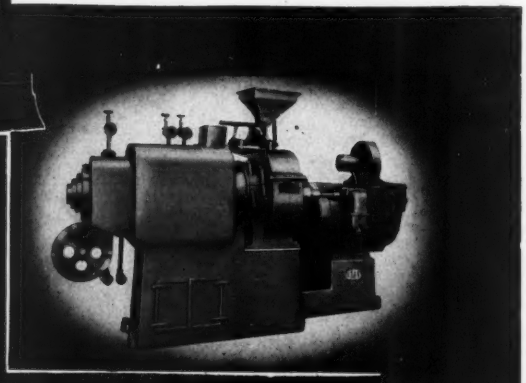
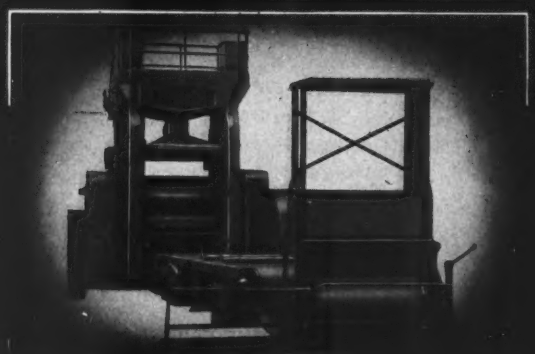
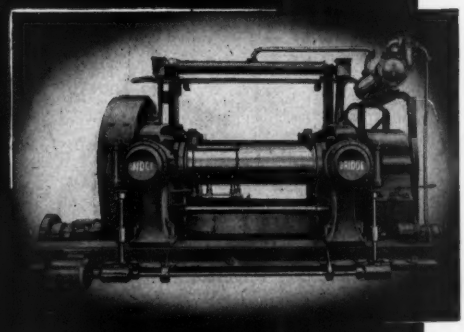
Precision Calender with four superimposed rollers. Flood lubrication. (2)

4½" Cold Feed Plastics Extruder. (3)

High temperature 22" x 60" Plastics Mill with flood lubrication. (4)







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Recently browsing through the Ferguson Archives, we noted an interesting fact :—

> . . . *that in* 1251 *Fergus O'Nestor "dyd praye alle his friends to gathere together and make merrie with hym on ye pleasaunce of ye greén olympianne fields neare Londonne.*"

This is no "Canterbury Tale," for our team of eminent Archæologists and Geologists have established beyond all doubt that those green olympian fields are now the site to be occupied by the

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June 6–16

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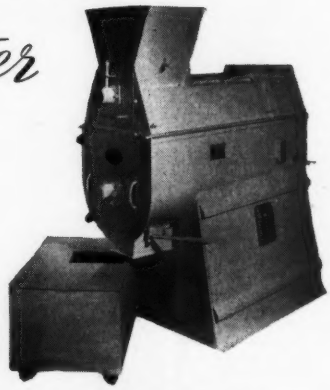

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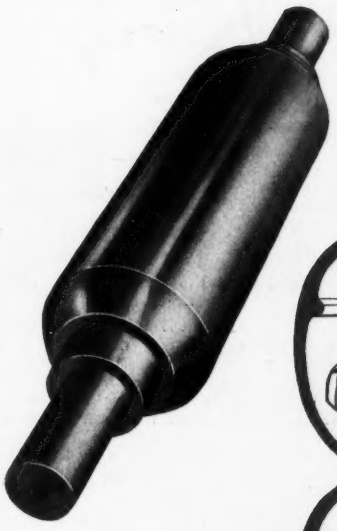

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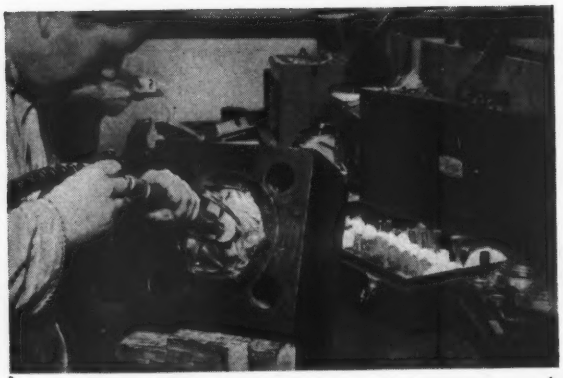

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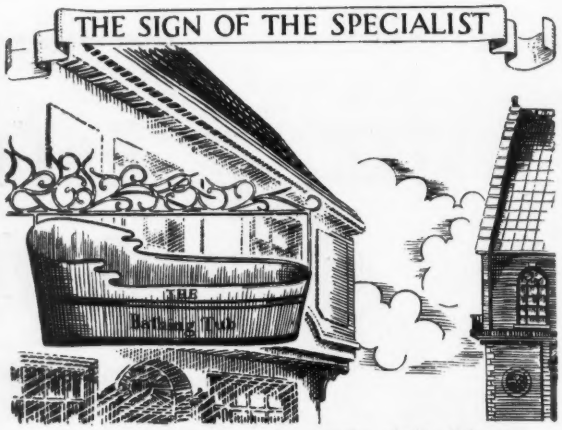

There were at least two examples of this "Bathing Tub" sign to be seen in London about 1760 — in Bishopsgate and near White Chapel Bars, and they may serve as a reminder that, as late as Victorian times, taking a bath meant carrying the water upstairs in buckets. Even the model "workmen's houses" designed by the Prince Consort for the Great Exhibition of 1851 were without bathrooms.

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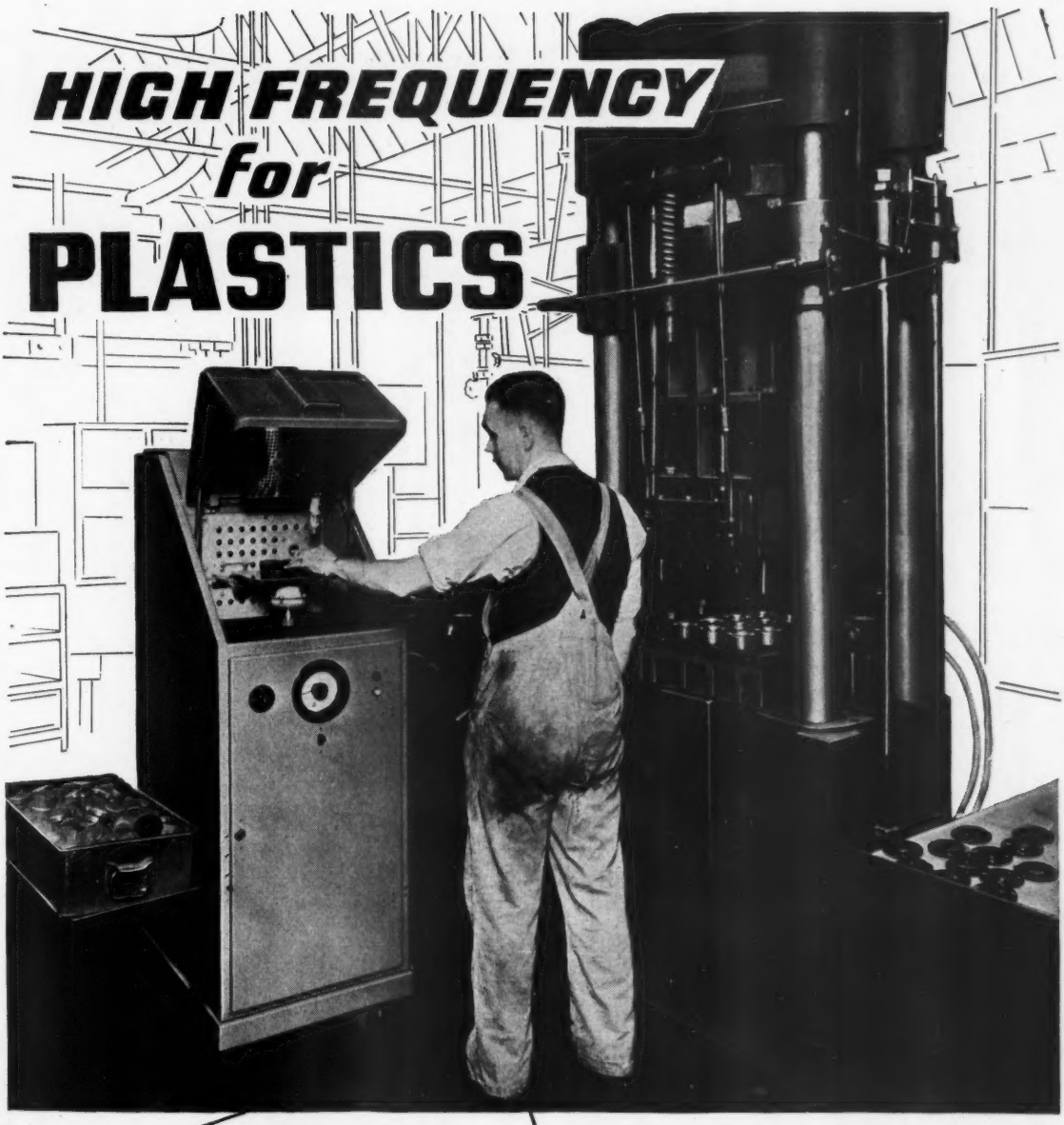

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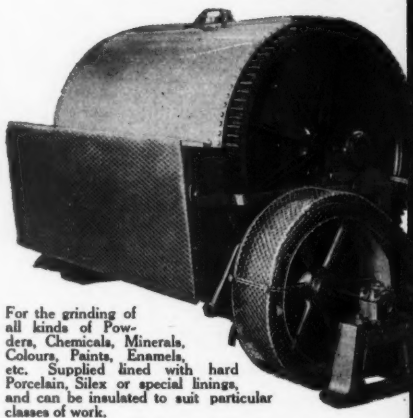

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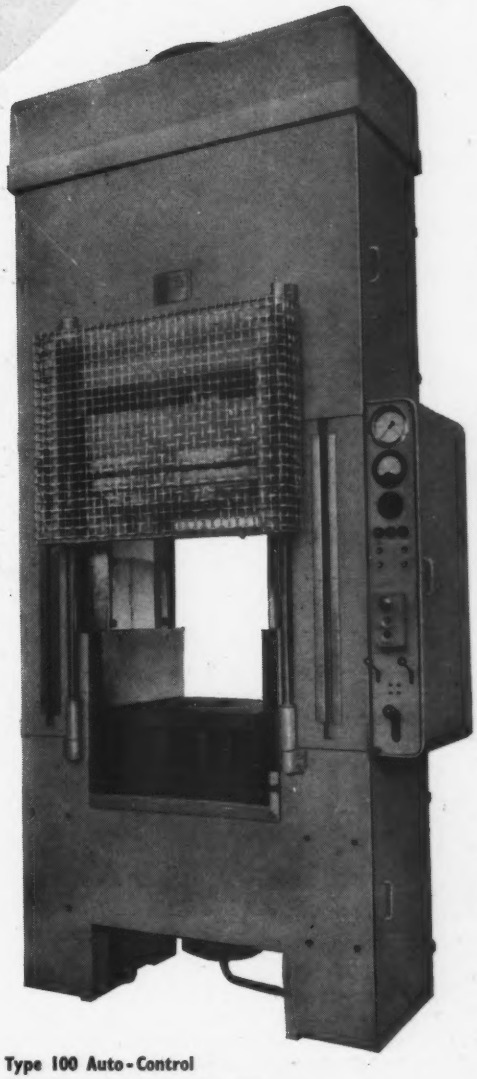
Type 100	Pressure range	50 - 150 tons
Type 200	Pressure range	100 - 300 tons



Type 100 Auto-Control Bipel Press, fitted transfer ram

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RAMS: Annulus type, hard chromed, fitted with C.I. piston rings.

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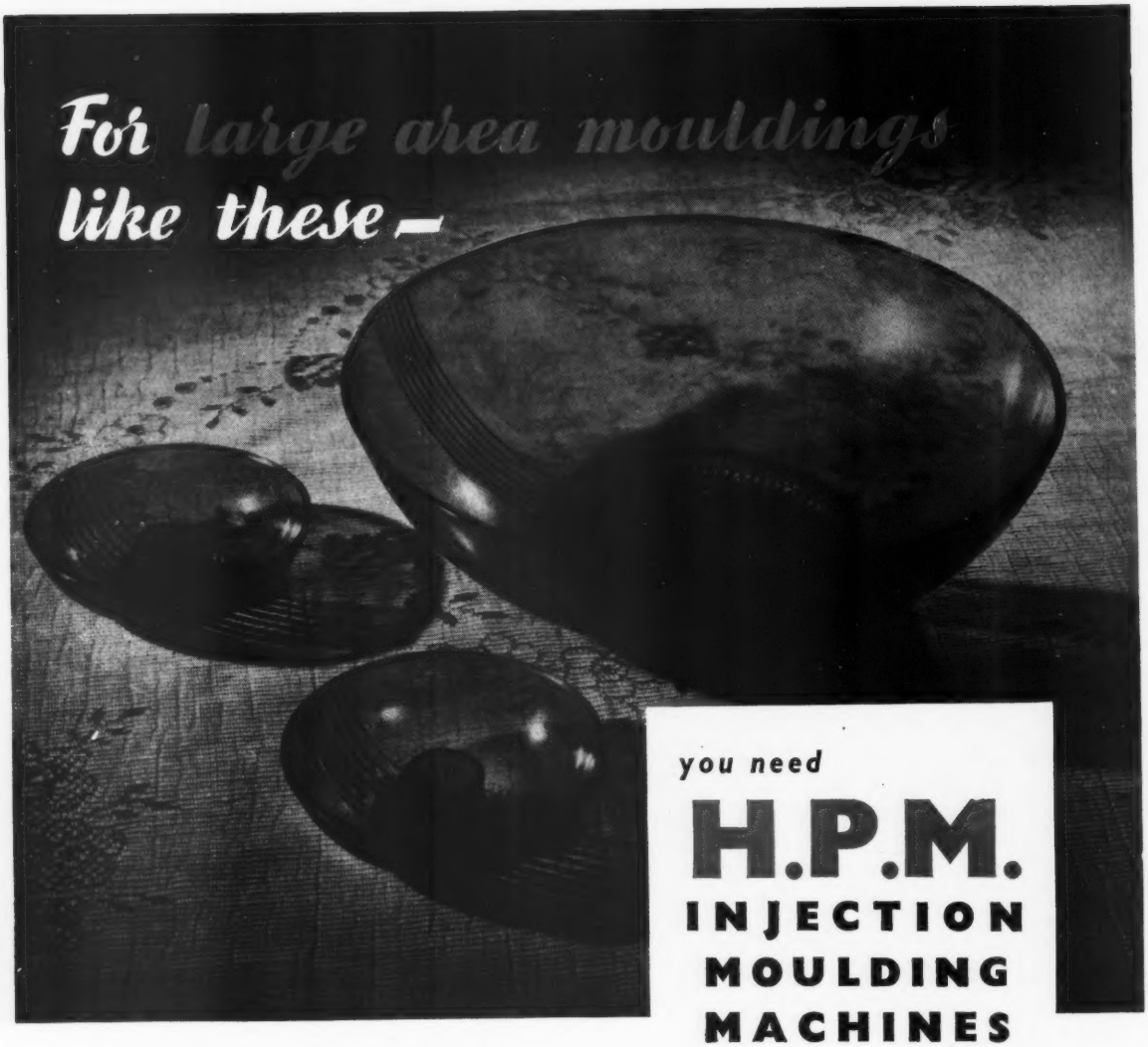

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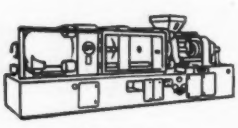
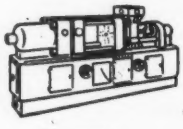
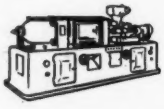
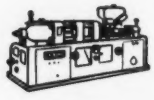

60 ounce


32 ounce


16 ounce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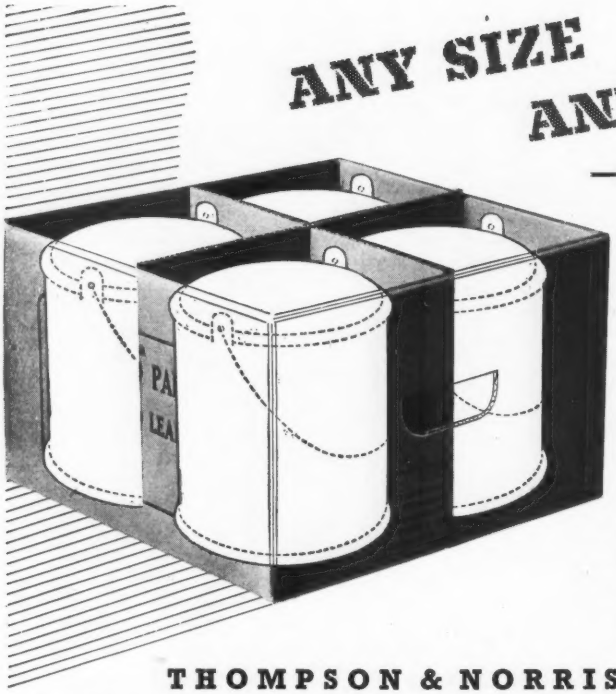

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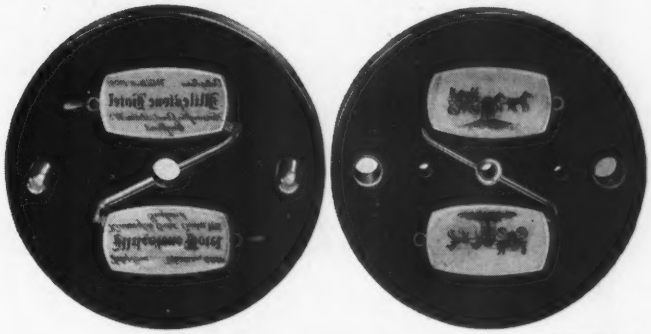

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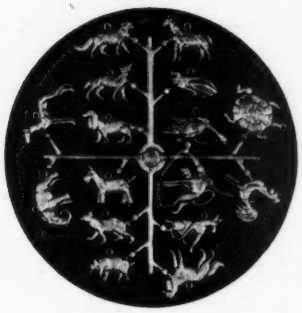

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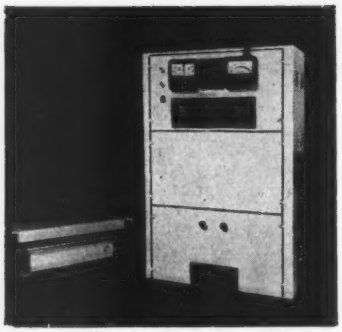

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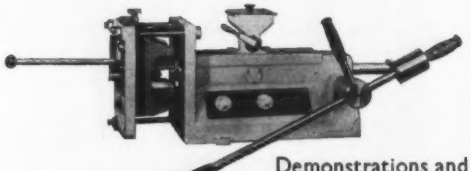

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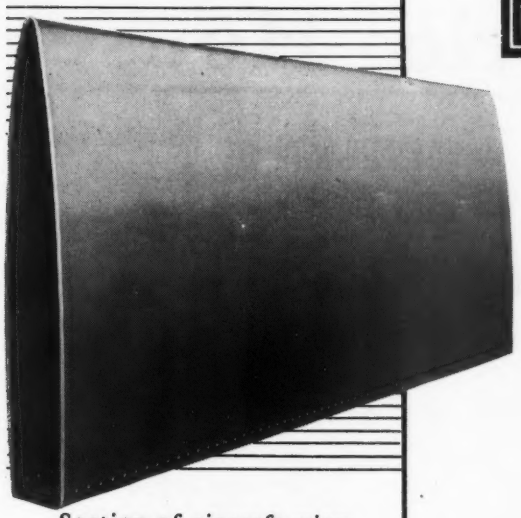

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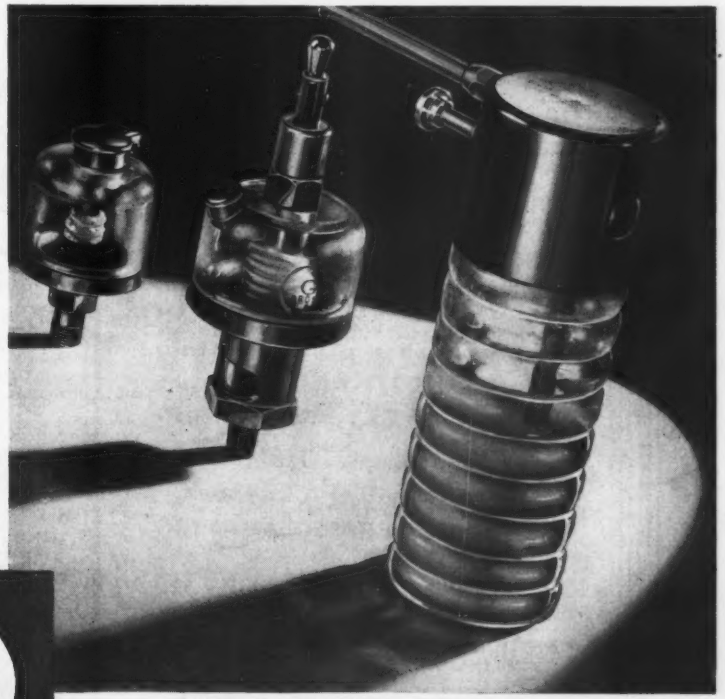

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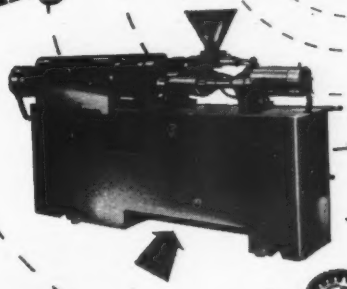

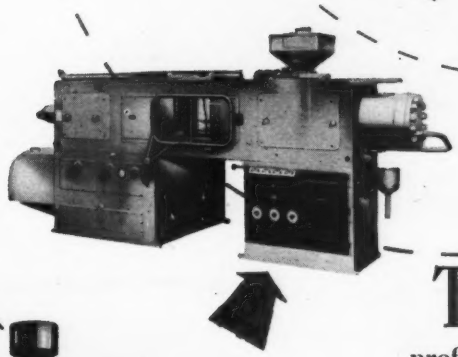

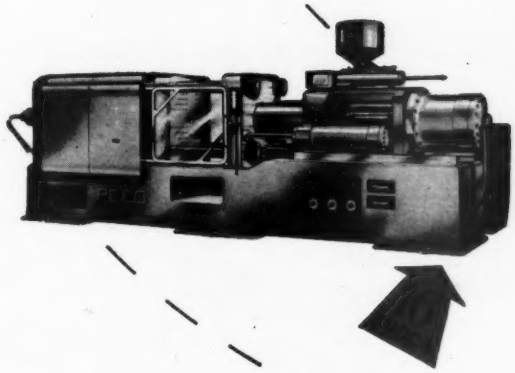

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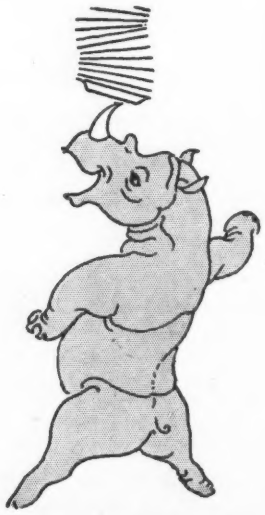

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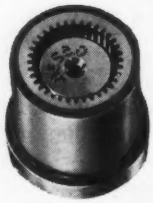

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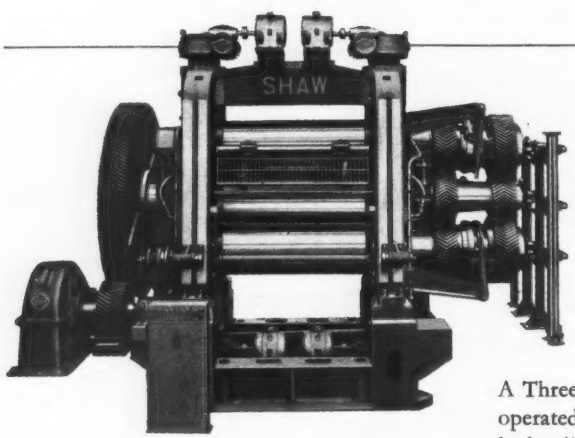

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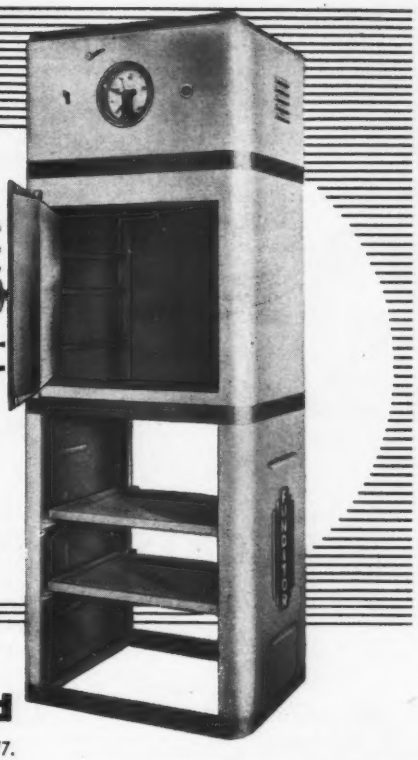

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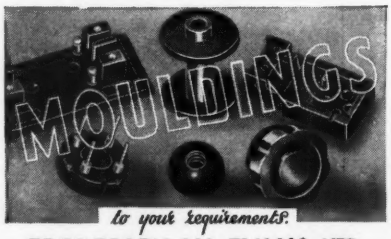

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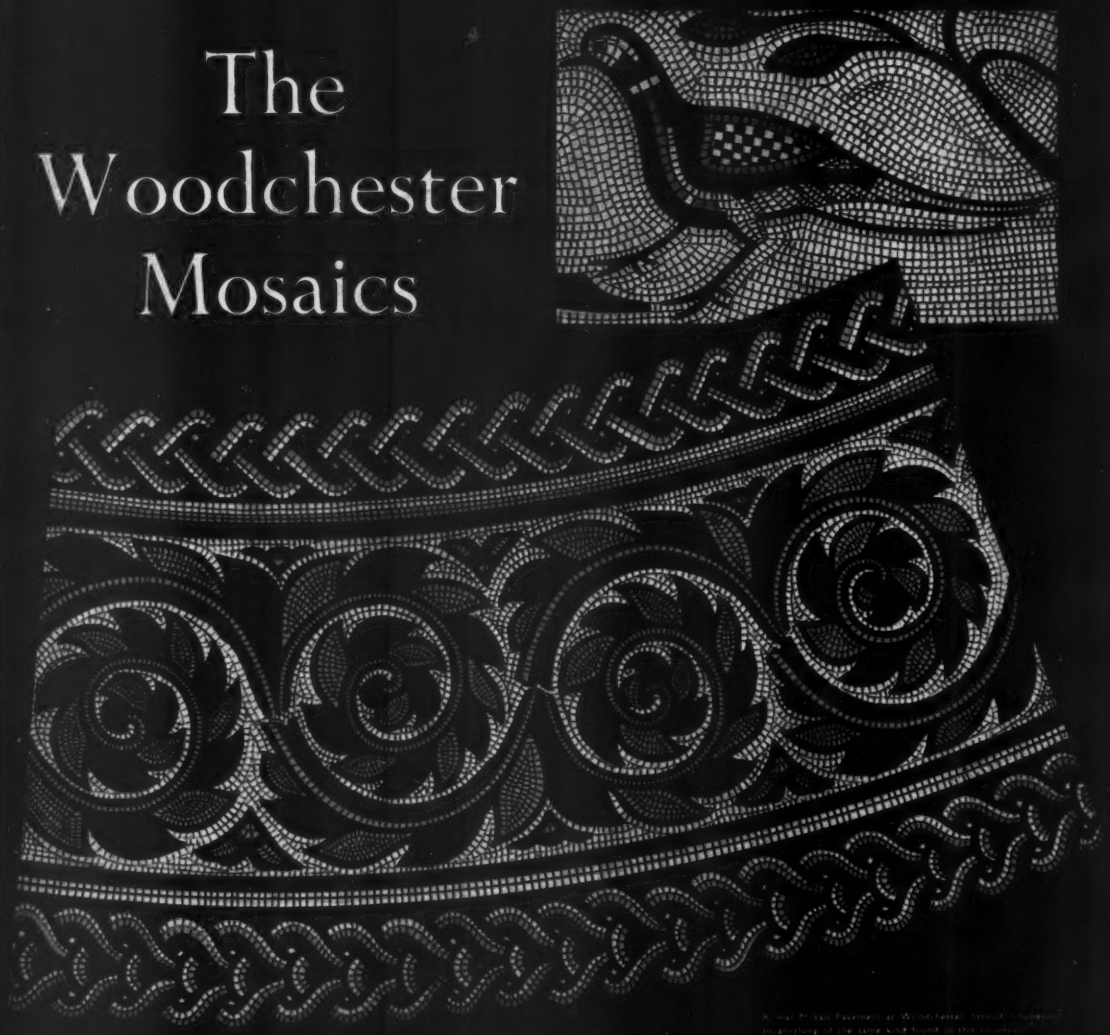

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